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Skeptical Inquirer

THE MAGAZINE FOR SCIENCE AND REASON

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ON INVISIBLE BEINGS

Clever Hans's Successors

Testing Indian Astrology

Believers' Cognitive Dissonance

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Skeptical Inquirer March/April 2013 | Vol. 37, No. 2

ARTICLES

34
Treatise on Invisible Beings
JOE NICKELL AND JAMES MCGAHA

40
The Elberfeld Horses
STEFANO VEZZANI

45
An Indian Test of Indian Astrology
JAYANT V. NARLIKAR

50
Understanding Believers' Cognitive Dissonance
JAMES WALKER

CONFERENCE REPORT

12
CSICon Nashville 2012
Ideas and Insights, Inquiries and Investigations: A Lively Conference Nashville Eyes Latest Trends in Science, Pseudoscience, and Belief

Economic Fraud: How Cons and Criminals Scam the Public

'Quackademic Medicine': Teaching Pseudoscience in Medical Schools

Gender Issues in Science: What's Different, What's Not?

FORUM

53
Closing the Book on 'Open-Mindedness'
KATJA PETROVIC

54
Help! I'm Being Followed by Ancient Aliens!
KENNETH L. FEDER

56
Perpetual Discussion!
MARK LEVY

COLUMNS

FROM THE EDITOR
A Good Look at Invisibility 4

NEWS AND COMMENT
Failure to Replicate Results of Bem Parapsychology Experiments Published by Same Journal/A Small Victory in the War on Quackery/Hall, Novella Join Executive Council of Committee for Skeptical Inquiry/Bent Spoon Awarded to Homeopath/Five New Fellows, Two Consultants Elected to Committee for Skeptical Inquiry/Paul Kurtz Changed Views on Secularism and Science/Registry for Parapsychological Experiments/Long Island Chicanery: Old Tricks in a New Package 5

INVESTIGATIVE FILES
Scotland Mysteries–Part I: The Silly Ness Monster
JOE NICKELL 20

THINKING ABOUT SCIENCE
The Proper Role of Sociology of Science
MASSIMO PIGLIUCCI 23

PSYCHIC VIBRATIONS
UFOs Infest Denver, Says Fox TV Affiliate
ROBERT SHEAFFER 25

THE SCIENCE OF MEDICINE
Herbs *Are* Drugs
STEVEN NOVELLA 28

SCIENCE WATCH
Innate Morality? Babies Weigh In
KENNETH W. KRAUSE 30

SKEPTICAL INQUIREE
Lessons from a Denver Fly
BENJAMIN RADFORD 32

NEW AND NOTABLE BOOKS 59

LETTERS TO THE EDITOR 62

THE LAST LAUGH 66

BOOK REVIEWS

The Parameters of Pseudoscience
DAVID MORRISON 58
The Pseudoscience Wars: Immanuel Velikovsky and the Birth of the Modern Fringe
by Michael D. Gordin

Flawed Look at Monsters
TERENCE HINES 60
Medusa's Gaze and Vampire's Bite: The Science of Monsters.
by Matt Kaplan

[FROM THE EDITOR

A Good Look at Invisibility

One of my favorite speculative novels is *Memoirs of an Invisible Man* by H.F. Saint. In this fine 1987 novel (later made into a very bad movie starring a miscast Chevy Chase) a thirty-four-year-old securities analyst is caught in an extraordinary scientific accident that renders him and a small spherical chunk of New Jersey invisible. Like all good science fiction (although this one has little science), the compelling aspect is the "What If?" If this happened to you, how would you live? Work? Drive? Eat? Make a living? From at least the time of H.G. Wells, invisibility has been a recurring, and often appealing, device of science fiction and fantasy, from *Star Trek*'s Romulan/Klingon cloaking device to Harry Potter's cloak of invisibility. Invisibility also plays a role in the new movie and classic novel *The Hobbit*. But that's all fiction.

In their "Treatise on Invisible Beings" in this issue, Joe Nickell and James McGaha take a broadly encompassing look at claims of entities reputedly capable of invisibility. It is remarkable how widespread such ideas are in the real world. By invisible the authors don't mean transparent, camouflaged, obscured, or microscopic but truly invisible: "incapable of being seen by human vision in the visual spectrum." Starting with a supposed "invisible girl" exhibited in eighteenth-century Paris, they roam over the entire topic: advanced technology (including the hoax *Philadelphia Experiment*), extra-dimensional realms, alien domains, the spirit realm, visionary experiences, "Magick," and deistic power. Popular belief notwithstanding, they conclude—not surprisingly—that allegedly invisible entities are indistinguishable from imaginary beings. It is a revealing look at an entertaining topic that's not all it appears to be.

This is the third time Nickell and McGaha have teamed up recently in the SKEPTICAL INQUIRER. They wrote "The Roswellian Syndrome," our May/June 2012 cover article, and "The Exeter Incident Solved," a special report in our November/December 2011 issue. Theirs is a cross-country collaboration. Nickell, a prolific investigator and writer, is of course our senior research fellow, based at our Amherst, New York, headquarters. McGaha, an astronomer, retired military pilot, and UFO skeptic, has his own observatory in Tucson.

In 1907, psychologist Oskar Pfungst published his now-classic exposé of Clever Hans, the supposed talking (and calculating) horse. The incident has since served as case study of the perils of subconscious experimenter influence on animal or human subjects. But Clever Hans nevertheless had his successors, and in this issue Stefano Vezzani tells the story of "The Elberfeld Horses," which also turned many scientific heads with supposed mathematical powers but in fact represented "an archetypal instance of pseudoscience."

There is much more in this issue, including a physicist's examination of Indian astrology, an inquiry into understanding believers' cognitive dissonance, a series of reports on our CSICon 2012 conference in Nashville, and many other columns, including Kenneth Feder's "Help! I'm Being Followed by Ancient Aliens" and Steven Novella's "Herbs *Are* Drugs," the latter being another reminder that herbal supplements are a dangerous and unregulated big business.

—KENDRICK FRAZIER

Skeptical Inquirer™

THE MAGAZINE FOR SCIENCE AND REASON

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Failure to Replicate Results of Bem Parapsychology Experiments Published by Same Journal

KENDRICK FRAZIER

Two years ago the prepublication release of a research paper by psychologist Daryl Bem claiming experimental evidence for precognition created a worldwide media stir and intense controversy within the scientific and skeptical communities.

Bem, of Cornell University, claimed that through nine experiments he had demonstrated the existence of precognition, specifically the existence of "conscious cognitive awareness . . . of a future event that could not otherwise be anticipated through any known inferential process." Essentially, he had claimed to have produced evidence that psychic abilities not only exist but can transcend time and allow the future to reach backward to change the past.

Informed critics of parapsychology were almost uniformly incredulous. Although Bem is a respected psychologist, they found so many flaws in the research protocols and methods that in their view the conclusions had no validity. One of the most stinging rebukes came in the form of an extended, in-depth critique of all nine experiments by York University psychologist and CSI Executive Council member James Alcock in the SKEPTICAL INQUIRER ("Back from the Future: Parapsychology and the Bem Affair," SI, March/April 2011; see also editorial "Why the Bem Experiments are Not Parapsychology's Next Big Thing" in the same issue).

Alcock also concluded that the journal that published Bem's study, the *Journal of Personality and Social Psychology* (JPSP), had done everyone a disservice by publishing this "badly flawed research article." Parapsychology and the journal's own reputation, he wrote, had been damaged, and the article's publication disserved the public as well, "for it only adds to [public] confusion about the existence of psi."

Experiments attempting to replicate Bem's results were quickly conducted at various universities, but none were accepted for publication by JPSP. In fact, it said it would not consider publishing replication failures. This fact raised more controversy and concern.

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Correcting the Past: Failures to Replicate Psi

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Across 7 experiments (*N* = 3,289), we replicate the procedure of Experiments 8 and 9 from Bem (2011), which had originally demonstrated retroactive facilitation of recall. We failed to replicate that finding. We further conduct a meta-analysis of all replication attempts of these experiments and find that the average effect size (*d* = 0.04) is no different from 0. We discuss some reasons for differences between the results in this article and those presented in Bem (2011).

Keywords: psi, precognition, ESP, researcher degrees of freedom, meta-analysis

Recently, Bem (2011) published an extremely thought-provoking article demonstrating the existence of precognition, a "conscious cognitive awareness . . . of a future event that could not otherwise be anticipated through any known inferential process" (p. 407). Through nine experiments, Bem found consistent support for the idea that people have such precognitive abilities. He suggested that these findings present examples of retroactive influence, through which future events influence people's current responses and that more broadly these findings are instances of *psi phenomena*, or "anomalous processes of information or energy transfer that are currently unexplained in terms of known physical or biological mechanisms" (Bem, 2011, p. 407).

In his article, Bem (2011) acknowledged that psi is a controversial topic. He reported data suggesting that many, if not most, academic psychologists do not believe that psi phenomena exist. Indeed, the publication of Bem's research met with a wide variety of reactions in the academic and popular media alike, and although some reactions were supportive, many were skeptical (Carey, 2011a; Carey, 2011b; Wagenmakers, Wetzels, Borsboom, & van der Maas, 2011). In light of the skepticism surrounding psi and in anticipation of the reaction to his article, Bem suggested that psi researchers must conduct tightly controlled experiments that demonstrate psi and "that can be replicated by independent investigators" (Bem, 2011, p. 407). Whereas Bem's article may indeed provide the necessary tightly controlled experiments, the purpose of the current article is to conduct and to synthesize replications by independent investigators.

Psi Phenomena

The precognitive abilities reported by Bem (2011) emerged across a range of tasks. As one example, in Experiment 1, Bem (2011) asked participants to select whether a picture would appear on the left side of the screen or the right side of the screen. Participants' selections were accurate more often than chance would predict when the picture in question was an erotic one (but not a neutral, positive, or negative one), suggesting that people have precognitive abilities to detect where erotic stimuli will appear.

Precognitive abilities also manifested on more complicated tasks. For example, in Experiment 5, participants were asked to choose which of two negatively arousing pictures they liked better. After this choice, the computer randomly selected one of the pictures to serve as the target picture, which then flashed subliminally on the screen from 4 to 10 times. Research on the mere-exposure effect suggests that subliminal exposure to a negative target increases liking of that target (i.e., causes habituation; Kunst-Wilson & Zajonc, 1980). Bem (2011) suggested that if people have precognitive abilities, their current liking of a negative picture would be enhanced by the fact that they will see that picture several times in the future (even though they have no known way of knowing that they will see it). Bem's results supported this prediction: When participants chose between negative picture pairs, they were more likely to prefer the one that would later be selected to be the subliminally presented target.

Perhaps the most straightforward and impressive demonstration of precognition emerged in Bem's (2011) Experiments 8 and 9, which documented "retroactive facilitation of recall" (p. 419). In these studies, participants saw 48 words and then were asked to recall as many of those words as possible. Next, participants were given a chance to practice a randomly chosen subset of the 48 words by, for example, retyping them and recategorizing them. In

933

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We would like to thank Eduardo Andrade and Justin Kruger for crucial assistance with the project and Gia Nardini for her help in collecting data for this article.

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"Correcting the Past: Failures to Replicate Psi."

The article is lengthy, but the central conclusion is succinctly stated:

"Across seven experiments (N = 3,289), we replicate the procedure of Experiments 8 and 9 from Bem (2011), which had originally demonstrated retroactive facilitation of recall. We failed to replicate that finding." They further conducted a meta-analysis of all replication attempts of the Bem experiments "and find that the average effect size (d = 0.04) is not different from 0."

To put it even more directly (from the beginning of their conclusions section): "We conducted seven experiments testing for precognition and found no evidence supporting its existence."

How can their results be reconciled with Bem's? "It is unclear how Bem could find significant support for a hypothesis that appears to be untrue," the authors say. They suggest such possibilities as what psychologists call Type I error—a false rejection of the null hypothesis. They also point to concerns about researcher degrees of freedom, which also raise the likelihood of falsely rejecting the null hypothesis. While many experimental decisions are defensible, "because their application is at the discretion of the researcher examining data after the completion of the experiment, they can make a true effect more difficult to discern. . . . Researcher degrees of freedom do not make a finding false . . . but they do make it much harder to distinguish between truth and falseness in reported data."

They end by quoting philosopher of science Karl Popper: "An effect is not an effect unless it is replicable, and a science is not a science unless it conducts (and values) attempted replications." They do compliment Bem for encouraging the independent replication of his experiments.

Alcock, who wrote SI's 2011 critique, has mixed feelings about the Galak et al. paper:

> While I am happy that they carried out this research and that it was published, I find it very odd that they focused on Bem's studies as though

> they had been carefully designed and well-executed. They were so poorly designed and so badly executed that the results do not merit the careful consideration that this research gives them. However, the experiments that Galak address, #8 and #9, were the best of a bad lot. Nonetheless, I am glad that they have done this research and that it is in print. It counters Bem's claims very nicely, without ruffling any feathers I guess.

Ray Hyman, professor of psychology emeritus at the University of Oregon and also a CSI Executive Council member, is another longtime expert on such research. Here is his initial comment:

> The number and size of their experiments, the detailed analyses, along with their inclusion of several other studies which fail to replicate Bem, deprive the parapsychologists of their standard excuses for dismissing failed replications. Bem and his supporters have one other excuse they can use. They can, and will, point to ways in which the Galak et al. experiments differ from Bem's experimental protocol. The authors have anticipated this and have adhered so closely to Bem's protocol, that whatever differences remain appear trivial.

Publication by JPSP of the Galak et al. paper may or may not bring to an end this latest dramatic claim of scientific evidence of the paranormal, but—combined with the previous critiques—it appears to have dealt a serious blow. As Alcock emphasized in his 2011 critique (and as Hyman has often also stressed), over the past eighty-odd years this kind of drama has played out multiple times, and "each time parapsychologists ultimately failed to persuade the scientific world that parapsychological phenomena (psi) really exist."

Kendrick Frazier is editor of the SKEPTICAL INQUIRER.

A Small Victory in the War on Quackery

MATTHEW COPE

I was surprised to see a display for a product made and distributed by a company called Healing Hazel on the dispensary counter of my pharmacy, a branch of the Jean Coutu Group (PJC) Inc. in Montreal.

The product is available as a range of necklaces and bracelets made of hazelwood links (prices range from about $14.95–$24.95). The claims in the point-of-sale material and the brochure immediately set my quackometer pinging into the red zone.

According to Healing Hazel, "Hazelwood helps neutralize acidity throughout the body," and "Its significant benefits have long been utilized by First Nations people." It "works for the most part" to relieve acne, eczema, psoriasis, kanker [*sic*] sores, ulcers, heartburn, arthritis, asthma, headaches, migraines, constipation, etc."

Its website (www.healinghazel.com/) makes for interesting reading too, including the fact that they are now offering hazelwood/amber necklaces and bracelets promoted with similar claims: "When amber is worn on the skin, the warmth of the body releases trace amounts of healing oils which is [*sic*] then absorbed into the blood stream [*sic*]. It is a natural remedy for side effects associated with teething, such as redness in the cheeks, droolling [*sic*], diaper rashes, swollen gums, etc."

The McGill University Office for Science and Society looks into the claims made by hazelwood promoters on its informative (and highly entertaining) blog site (http://blogs.mcgill.ca/oss/2012/03/02/can-hazelwood-or-amber-necklaces-help-with-the-pain-of-babies-teething).

Among its findings:

> Hazelwood, they say, has the medicinal property of neutralizing the body's acidity. And what do the amber necklace promoters claim as a mechanism for the miraculous work of their product? It releases succininic acid! It increases acidity!
>
> There are several layers of nonsense here. First of all, the body isn't acidic or basic. That concept makes no sense. Body fluids such as blood, sweat or urine can be acidic or basic, but not the body itself. As far as blood goes, it has to be alkaline with a pH between 7 and 7.4. If it wanders outside this range, it's a life-threatening situation. While it may be possible to slightly alter blood pH by diet, it certainly isn't possible to do so by wearing a necklace.

Healing Hazel offers no proof or science, cites no properly conducted controlled double-blinded placebo studies, and offers no links to credible sources that could back up its claims.

Clearly, by placing this on the counter of the dispensary, the pharmacy was tacitly endorsing the product. I brought my concerns to the attention of the branch owner, who is also a pharmacist. I told him I don't have a problem with people who choose to waste their money on useless—or at best unproven—products, but placing this display on the counter of the dispensary undermined customer confidence in the credibility of his pharmacy.

He immediately agreed and told me that the hazelwood products would be moved elsewhere forthwith. He explained that much as he would like to, he couldn't remove them altogether because the purchase had been made by his head office—the Jean Coutu Group. But he did add that he refuses to sell homeopathic products in his pharmacy.

In conclusion, the McGill blog puts it best:

> There is no science here, just some testimonials, the same as one might get for any intervention be it a hazelwood or amber necklace, or a suppository made from earwax collected by albino virgins from Ethiopian mountain goats by the light of the full moon. . . . What makes people buy into such folly? It's the packaging. The necklaces come wrapped in a mix of scientific illiteracy, simple credulity and wishful thinking.

What the blog doesn't say is that any one of us can make a difference. Arguing with true believers is usually a waste of time, but taking a small action where it might actually get results can be well worth the effort.

Matthew Cope works in Montreal's burgeoning TV animation industry, writing scripts and story editing for a variety of shows.

Hall, Novella Join Executive Council of Committee for Skeptical Inquiry

The Committee for Skeptical Inquiry has announced that two luminaries of science and skepticism, CSI Fellows Harriet Hall and Steven Novella, have been elected to the Committee's Executive Council.

"We're extremely fortunate to have two such important figures in the skeptic movement formally take leadership positions at CSI," said Barry Karr, executive director of the Committee for Skeptical Inquiry. "Dr. Hall and Dr. Novella have made extraordinary contributions to the public's understanding of science, and have better armed us against the insidiously false and absurd claims that pervade medicine and the media."

Members of the CSI Executive Council are charged with developing programs for the Committee and making recommendations on the activities and areas of activism on which CSI should focus. They serve on the editorial board of the SKEPTICAL INQUIRER, assist and advise in conference and event planning, take part in the election of new Fellows and Consultants, and represent CSI at outside events and in the media.

Harriet A. Hall, MD, a retired Air Force physician and flight surgeon, has made a national name for herself by educating the public about pseudoscientific and so-called alternative medicine. She is a contributing editor and frequent contributor to both the SKEPTICAL INQUIRER and *Skeptic* magazines, and wrote "The Health Inspector" column for *O, The Oprah Magazine*. On the web, she contributes to the blog *Science-Based Medicine* and serves as an advisor for the website Quackwatch. In 2008, she published the book *Women Aren't Supposed to Fly: The Memoirs of a Female Flight Surgeon,* and coauthored the 2012 textbook, *Consumer Health: A Guide to Intelligent Decisions.*

Steven P. Novella, MD, is an academic clinical neurologist at Yale University School of Medicine. His column "The Science of Medicine" appears in the SKEPTICAL INQUIRER, and he is host of the popular weekly science podcast *The Skeptics' Guide to the Universe*. His *NeuroLogicaBlog* covers news and issues in neuroscience, skepticism, and critical thinking, and he is founder and executive editor of the blog *Science-Based Medicine*. He is currently president of the New England Skeptical Society, a senior fellow and Director of Science-Based Medicine at the James Randi Educational Foundation, and a founding fellow of the Institute for Science in Medicine.

Bent Spoon Awarded to Homeopath

GURMUKH MONGIA

For thirty years, the Australian Skeptics have annually presented the Bent Spoon Award in mockery of prominent pseudoscience. Richard Saunders, president of the Australian Skeptics, says that he's proud to be involved with this important tradition:

> The Bent Spoon is awarded each year by the Australian Skeptics to the perpetrator of the most preposterous piece of paranormal or pseudoscientific piffle. It's meant as sort of a light hearted award, although it does have a serious side to it. Take the winner of the 2012 Bent Spoon Award: Fran Sheffield of Homeopathy Plus. Now this is a group who advocates the use of Homeopathy instead of vaccines for polio or whooping cough or meningitis or anything you care to mention. They also claim that you can use Homeopathy to treat domestic violence, a bizarre claim indeed. If the Bent Spoon award helps shed light on the activities of these people, then it's well worth it.

Alternative health advocates have often been the recipients of this award, including several anti-vaccination advocates such as Dr. Viera Scheibner, the company Gentle Heal Pty Ltd, and Meryl Dorey of the infamous Australian Vaccination Network. Almost half of the Bent Spoon Awards have been given out to promoters of "alternative health" practices, demonstrating just how widespread they are.

The award itself is constructed from a polished and glossy chunk of gopher wood that (it is said) originated from Noah's Ark. Affixed to this piece of wood is a spoon that (many believe) may have been used during the Last Supper. The spoon has been bent into a graceful curve by unexplained energies that are (suspected to be) unknown to science.

The Bent Spoon Award was first given out in 1982 to Tom Wards, a notorious "psychic" who made many predictions of world events that were remarkable for their inaccuracy.

The latest recipient of the Bent Spoon Award, Fran Sheffield, is a homeopath based in New South Wales who manages

the Homeopathy Plus website. Sheffield has, on more than one occasion, completely ignored sanctions from the Therapeutic Goods Administration that would force her to take down misleading advertisements and replace them with a severe statement of retraction.

One outrageous claim from the Homeopathy Plus website is that homeopathy "treats excesses of human behavior," including victims and perpetrators of domestic violence. The website also labels the whooping cough vaccine as "unreliable," and advises visitors to the website to "hotfoot it to your local homeopath if you are struggling with whooping cough."

Approximately one in twelve Australian babies (8 percent) has not been fully immunized. For herd immunity to take full effect, this number needs to be lowered. Herd immunity is extremely important for children who are not able to receive proper immunization. These children rely on herd immunity to keep them safe. In November, the Australian Academy of Science distributed a booklet that dispelled the myths about vaccination in an attempt to convince parents to do the right thing for the health of their children.

The Australian Skeptics also hope that their Bent Spoon Award will bring some much-needed attention to this issue. The award was presented at a dinner during the Australian Skeptics' national convention. In addition to the Bent Spoon Award, the Australian Skeptics also gave out the 2012 Skeptic of the Year award. This more desirable award went to the lobby group Friends of Science in Medicine in recognition of their efforts to challenge Australian universities that provide courses in medical pseudoscience, such as acupuncture, naturopathy, reflexology, and chiropractic.

Gurmukh Mongia is a computer scientist working in the field of web development. He currently operates a blog and podcast related to critical thinking, *The Dumbasses Guide to Knowledge* (www.dumbassguide.info).

Five New Fellows, Two Consultants Elected to Committee for Skeptical Inquiry

The Committee for Skeptical Inquiry has elected five new Fellows. Hailing from a range of disciplines, they were chosen for their significant contributions to the public understanding of science, reason, and critical inquiry through scholarship, writing, and work in the media. On CSI's roster of Fellows, past and present, they join the likes of such legends as Carl Sagan, Isaac Asimov, James Randi, E.O. Wilson, Elizabeth Loftus, Eugenie C. Scott, Nobel laureates Murray Gell-Mann, Harry Kroto, and Steven Weinberg, and of course the late Paul Kurtz. The list of present Fellows appears on the inside cover of every issue of the Skeptical Inquirer.

Fellows are recommended by other Fellows and elected by the CSI Executive Council. That body met in Nashville October 28, 2012, immediately following the CSICon 2012 conference there.

The five new Fellows:

David H. Gorski. Cancer surgeon and researcher at the Barbara Ann Karmanos Cancer Institute and chief of the breast surgery section, Wayne State University School of Medicine, Detroit, Michigan. Both an MD and a PhD, Gorski is managing editor of *Science-Based Medicine*, a blog exploring controversies in the relationship between science and medicine. Since first becoming interested in pseudoscience and "alternative" medicine around 2000, he has become a frequent blogger examining and exposing quackery and pseudoscience.

Terence Hines. Professor of Psychology, Pace University, Pleasantville, New York. He is also an adjunct professor of neurology at New York Medical College, Valhalla, New York. His research interests include genetic and cognitive bases for belief in the paranormal. Hines is author of *Pseudoscience and the Paranormal*, in its second edition, and he frequently does critical reviews of work in parapsychology. His PhD is from the University of Oregon, where he was a student of Ray Hyman.

Clifford A. Pickover. Scientist, author, editor, IBM T.J. Watson Research Center. Pickover's PhD is in the field of molecular biophysics and biochemistry, but his dozens of books range over the entire spectrum of science and mathematics to religion and history. His three most recent are *The Medical Book*, *The Physics Book*, and *The Math Book*. Pickover's books are motivated by his interest in bringing science, mathematics, and creativity to the broader public. Also an inventor, he has been awarded more than one hundred U.S. patents.

Joe Schwarcz. Director, McGill Office for Science and Society. The office is dedicated to helping the public separate sense from nonsense. Schwarcz, who has a PhD in chemistry, is a professor at McGill University in Montreal and is widely known, under the moniker "Dr. Joe," for his science popularization efforts including books, public lectures, a weekly newspaper column, a weekly radio show, and frequent segments on the Discovery Channel Canada.

Indre Viskontas. Cognitive neuroscientist, television and podcast host, and opera singer, San Francisco, California. With a PhD in neuroscience, her research has explored the neurological basis of memory, reasoning, and creativity. She cohosted the television show *Miracle Detectives* where she provided the scientific view in examining mysterious events. Since February 2012, she has cohosted the Center for Inquiry's radio show and podcast *Point of Inquiry*.

In addition to the new Fellows, two new Scientific and Technical Consultants for the Committee for Skeptical Inquiry have been elected:

Sharon Hill: Geologist, writer, researcher, creator and editor of the *Doubtful News* blog (doubtfulnews.com), Harrisburg, PA.

Tim Printy: Amateur astronomer, UFO skeptic, former Navy nuclear reactor operator/division chief, Manchester, NH.

Paul Kurtz Changed Views on Secularism and Science

Steven Pinker
and Rebecca Goldstein

It's a bittersweet honor to say a few words in memory of our dear friend and a great man, Paul Kurtz. Before there were celebrity atheists, there was Paul. Paul did not appear on the *Colbert Report*, did not write bestsellers, and did not travel on coast-to-coast book tours. But Paul did something deeper and more fundamental that paved the way for those of us that came after him.

Paul, first of all, changed the world's view of what it meant to be a champion of secularism and science. He did not define himself as an atheist, in terms of something we should *not* believe in, but rather as a humanist, in terms of things we *should* believe in. In his various humanist manifestos, Paul laid out a positive agenda for a defensible, enlightened, moral worldview, one that did not depend on dogma or supernatural agents, but that laid out a moral vision and agenda that we could positively believe in and work to fulfill.

Paul also built institutions: brick and mortar institutions but also magazines and book imprints and associations that outlived him and that carried his message to a much greater audience than any single person could have done on his own.

So, in mourning Paul's passing, we certainly can't comfort ourselves with the thought that he's up there looking down on us, or that we'll meet him again someday. Paul would be the last person that would tolerate such bromides. But we can comfort ourselves with something deeper: that Paul left us a world that was better for his efforts.

Steven Pinker is Johnstone Family Professor in the Department of Psychology at Harvard University.
Rebecca Goldstein is a novelist and philosopher and is currently the Franke Fellow at the Whitney Humanities Center, Yale University.

Registry for Parapsychological Experiments

Caroline Watt

A webpage for registering parapsychological experiments has been implemented by the Koestler Parapsychology Unit (KPU) at the University of Edinburgh. Registration prior to conducting an experiment eliminates many common biases in research and is particularly valuable for controversial topics. It is a well-established practice in medical research but has not been formally practiced in parapsychology or academic psychology.

Prospective registration makes a planned experiment a matter of public record, which prevents the suppression of results that do not come out the way the experimenters hoped. Registration includes the specific hypotheses that are planned, which prevents experimenters from adapting the experimental hypotheses to match the results or reporting results for only the analyses with favorable outcomes. Medical journals increasingly require registration of studies as a condition for publication.

The value of study registration for parapsychological experiments has been discussed many times, but a registry has not previously been available. This study registry provides an opportunity to demonstrate that the experiments are free of common biases in experimental research. These biases can be very difficult to detect without prospective registration. Registration is valuable for experiments conducted by skeptics as well as for experiments by proponents of the paranormal.

The KPU study registry webpage is at http://www.koestler-parapsychology.psy.ed.ac.uk/TrialRegistry.html.

Other options for study registration may become available in the future. The KPU registry webpage is also intended to serve as a resource that will provide information about other registration options as they become available.

Caroline Watt is at the Koestler Parapsychology Unit, Department of Psychology, School of Philosophy, Psychology, and Language Sciences, University of Edinburgh, Edinburgh, UK.

Long Island Chicanery: Old Tricks in a New Package

Bryan Farha

James van Praagh. Sylvia Browne. John Edward. It's starting to sound like a broken record, but make way for the next in a long list of alleged psychics who have hit it big with the media—Theresa Caputo. You probably know her from the *Long Island Medium*, a popular television show on The Learning Channel (TLC). To no skeptic's surprise, TLC in recent years has been using the word "learning" very loosely (although I credit their sister network, Discovery Channel, for airing critical-thinking shows like *Mythbusters*). *Long Island Medium* is yet another show devoid of scientific scrutiny by TLC, most assuredly because of the almighty dollar. While the show is now enjoying its second season, its inaugural season netted 1.3 million viewers per episode.

Forgive me for describing Caputo's methods using the same old terms and phrases you've heard in describing those of the others mentioned in the previous paragraph—subjective validation, fishing, cold reading, and warm reading—but that's what it is.

Theresa Caputo likes to give presumably "impromptu" readings (although I don't assume that anything is genuinely impromptu in an edited program). She does this by giving readings while she is out and about doing her daily errands and such. I

"It is error only, and not truth, that shrinks from inquiry."
– Thomas Paine

3 FOR TOMORROW

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Since 1976, three remarkable organizations have been at the forefront of efforts to promote and defend critical thinking and freedom of inquiry. The **Committee for Skeptical Inquiry** (founded in 1976), the **Council for Secular Humanism** (1980), and the **Center for Inquiry** (1991) have advocated, championed, and, when necessary, defended the freedom to inquire—while demonstrating how the fruits of objective inquiry can be used to understand reality, refute false beliefs, and achieve results that benefit humanity.

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CSI Fellow and SKEPTICAL INQUIRER Editorial Board Member James Alcock leads a class at a Skeptics' Toolbox event. The Toolbox has been held every year, except once, since 1992.

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started noticing that when she gives readings to passers-by—in one instance at a supermarket—that they were noticeably less detailed ("I can tell that your mother is with you") than when she would read an employee at a retail outlet. The employees got a more detailed reading, like she did in a coffee shop with an employee's mother in one episode ("Your mother—she told me she was a seamstress"). Why would this be? While I can't be certain of this, it could be that the employee is likely present in the establishment each time Caputo visits the retailer and she could be finding out information in advance. Don't many employees have name tags? Hmmm. Of course, the general reading (cold reading, in fact) elicited tears since it was a heart-warming message.

But what psychic's record is complete without incorrect assertions as well? On *Anderson Live*, Caputo asked a man in the audience—knowing his wife had died—"Is that your wedding ring [from your wife]?" The man replied, "No, it's my mother's." Caputo was wrong. Regarding furniture, Caputo asked the man, "Do you still have the chair?" to which the man replied, "No." Wrong again. Caputo continues, "Did she have an issue with her legs prior to her passing?"—the man replies, "No." Wrong yet again. Adept at fishing (asking a question to a large group of people, hoping that just one will answer positively), she cleverly asked the entire audience (250 to 300 people) if someone they knew had an issue with their legs—so the failure was overlooked and *attention was diverted to someone on the other side of the studio.* This happened with lightning speed, so the inaccuracies were unnoticed by most.

She commented to another person whose mother had passed, "So when you would sit with mom [when you felt her spirit], you would feel the presence of others who had departed—is that correct?" The audience member shook her head "no." Once again, wrong. Sometimes even fishing to the masses fails and psychics really wind up with egg on their faces—like Caputo did with yet another *Anderson Live* audience member: "So who was buried in a red dress?" Complete silence. Ouch. Questioning another audience member (who had lost her mother), "Is your dad also departed as well?" She responded, "Yes." Caputo says, "So know that they are together." This made the audience member feel comforted. But there's a problem with this exchange. If Caputo knew that they were together, why did she need to ask if her father had departed?

Long Island Medium is yet another show devoid of scientific scrutiny by The Learning Channel, most assuredly because of the almighty dollar.

Caputo was busted, but I'm sure loyal believers would dismiss the failure.

This train of logic (or illogic) is similar to what she said at the start of one of her TLC programs: "When I told my husband I was a medium, he didn't know what to say." Wanting the viewer to believe she had to tell her husband she was a psychic after being married several years is a hard pill to swallow. He couldn't figure it out for himself? It also doesn't square with her saying on *Anderson Live* that she has been psychic all her life. If so, her husband should have known from the get-go. Hmmm.

Now for the million-dollar question: Why does Theresa Caputo receive so many disconfirming answers from the subject being read when she's a guest on other television shows, yet more confirming answers when on her own program? Do I really have to answer this, or can I just say that it's much easier for a magician to do card tricks when they're using their own deck of cards?

But what about some of the apparently amazing things she's done, like convincing a group of skeptics that she has true psychic ability? Did you hear about this one? There has to be a catch, right? As it turns out, according to CSI web columnist Karen Stollznow, the "skeptics" were a group of Caputo's husband's friends in the motorcycle shop where he was employed. *Her husband's friends*.

So why is she so popular? First, she has the same fast-paced speech and rapid-fire readings that helped John Edward to fame. This is a huge advantage because it doesn't give the person being read time to calculate hits and misses. But it sure *seems like* there have been many hits. Therefore, there are more readings to be subjectively validated in a shorter amount of time, leading to *perceived* accuracy (even though the rate of hits is poor). Second, she has a novel twist in that her TLC gig is, essentially, a reality show. Recall the impromptu readings of strangers (in the David Blaine and Criss Angel tradition). Again, I'm not staking my paycheck on these being truly impromptu encounters, but at least the illusion of such has been created. It's a fresh twist for a psychic television show. Same song—different verse.

Theresa Caputo won the Pigasus Award for Performance from the James Randi Educational Foundation in 2012. Performance is the operative word. As for The Learning Channel, what have we really learned? Now, for the saddest part of all: Why do so many people want to watch it? As usual, it tells us more about ourselves than it does Caputo or TLC.

Acknowledgments

Thanks to my friend Denise for asking me to investigate Caputo and to Kai for urging me to write this piece.

Bryan Farha is professor of Behavioral Studies in Education at Oklahoma City University. He is a CSI consultant and editor of *Paranormal Claims: A Critical Analysis*. His e-mail address is bfarha@okcu.edu .

Ideas and Insights, Inquiries and Investigations:
A Lively Conference in Nashville Eyes Latest Trends in Science, Pseudoscience, and Belief

Kendrick Frazier

Photos by Brian Engler

Our CSICOP group (now the Committee for Skeptical Inquiry) originated the skeptics' conference. So it was refreshing when, after a multiyear hiatus, CSI got back into the conference scene in October 2011 with its CSICon conference in New Orleans. That proved a fun intellectual idea fest (see reports in our March/April 2012 issue). It was good to be back. For the 2012 conference (October 25–28), CSI moved the CSICon site north to Nashville, another lively location, and the talks, symposia, and surrounding events garnered generally great reviews from participants.

The irrepressible Richard Wiseman, the U.K. psychologist and CSI Fellow, emceed throughout the conference with his usual effervescent wit. Many speakers were CSI Fellows; all were knowledgeable experts. Chief conference organizer and CSI Executive Director Barry Karr didn't speak but was everywhere in evidence. The Halloween party again was a big hit. There was a midnight séance to call up Houdini (he didn't show). The whole thing concluded on Sunday with a lively first-ever full-audience interactive discussion with members of the CSI Executive Council.

CSI dedicated the conference to our founder and former longtime chairman, the philosopher Paul Kurtz. Kurtz died the weekend before at the age of eighty-six (see our January/February 2013 issue for tributes). In the opening remarks, committee CEO and President Ronald A. Lindsay and I, representing Skeptical Inquirer and the CSI Executive Council, lauded Kurtz's powerful legacy

in creating the modern skeptical movement. Many speakers over the next days likewise remarked on Kurtz's key role in creating the first organized movement to advance critical inquiry, the scientific attitude, and informed scientific criticism of paranormal and pseudoscientific claims.

A live-audience two-hour taping of *The Skeptics' Guide to the Universe* podcast followed. The Novella clan (Steven, Bob, and Jay), Rebecca Watson, and Evan Bernstein showed why their weekly science-and-skepticism show is so popular. George Hrab then entertained with his unique combination of guitar and skeptical wit.

(All this was preceded by two preconference workshops, one by the Skepchicks applying skepticism to everyday nonsense, one on conducting investigations.)

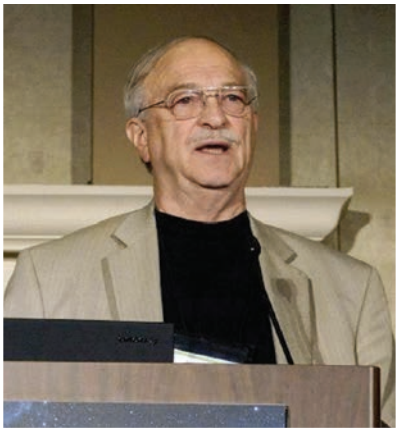
The conference was off to a fine start. I was able to hear most sessions (I missed a couple of individual speakers). Some highlights I found memorable follow.

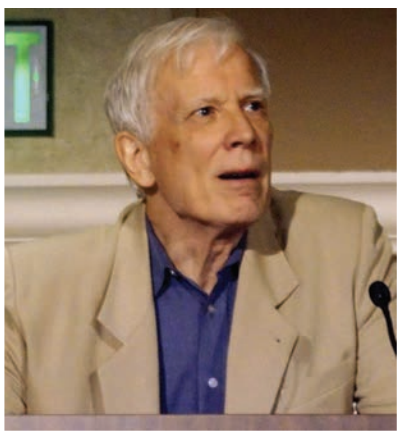
Biologist P. Z. Myers is most known for his outspoken attacks on religion, but at CSICon for the second year in a row, he surprised many by giving a straight science talk. The first part dealt with differing rates of evolution. "Selection works best in very large populations with a low mutation rate," he said. "Small populations with a high mutation rate are dominated by chance." Lest we think humans are numerous in biological terms, he quickly disabused. Humans have "a small population," about 7×10^9. In contrast *Pelagibacter*, which make up half of all bacterial plankton in the ocean in summer, number about 2×10^{28}. "So in humans, selection is not the prime pressure for change."

Recent research into the gorilla genome shows, to the surprise of some, that "in 30 percent of the genome gorillas are closer to humans or chimpanzees than the latter are to each other." He then described how that agrees with calculations in what's called coalescent theory, a population genetics model for tracing genes back to common ancestors. The anti-evolution Discovery Institute, Myers said, claims that the gorilla genome research messes up the human genetics connections to the great apes. "That's hilarious," Myers said. "These people don't have a goddamned clue about evolutionary biology. They are dead wrong."

Psychologist James Alcock led off a session on Belief and Memory with a survey about belief, noting that beliefs are a dynamic production and can be produced very quickly. Some beliefs are based on reason and carefully assembled evidence, but many are based on social constructions (we rely on the perceptions and reactions of others we trust) and feeling. The "feeling of knowing" is an emotion and is not tied to knowledge and may have nothing to do with reality. As for belief and disbelief, assessment is a two-stage process. We automatically believe new information before we assess it. Judging it comes later, if at all. The brain processes content information and veracity information separately. He revisited "The Belief Engine" he wrote about in SI many years ago ("we are a belief-generating engine") and ended by emphasizing again that some beliefs correlate with reality, and some do not.

Psychologist Elizabeth Loftus noted that beliefs can begin to feel like memories, "then we have false memories." She described some of her and colleagues' ground-breaking experiments demonstrating that beliefs can be implanted. She also gave examples of prominent political figures recalling false memories, noting, "no one is protected from having false memories." She also emphasized the notorious unreliability of eyewitness testimony, noting the Innocence Project has used DNA evidence to overturn 225 wrongful convictions, "most based on faulty memories." She facetiously proposed that the oath administered to witnesses testifying should be changed to: "Do you solemnly swear to tell the truth, the whole truth, or whatever you think you remember?"





Neuroscientist Indre Viskontas praised the value of storytelling as a memory aid ("to remember details of a past event, make them part of a great story") but noted that remembering is a reconstructive process that is often the functional equivalent of imagining.

In "Is Paul Dead?" investigator Massimo Polidoro gave one of the most entertaining talks, a multimedia feast of imagery and music and sounds playfully exploring the persistent idea that Paul McCartney of the Beatles is dead. "What is going on here?" Polidoro asked. "There's no evidence of a preplanned hoax. . . . You start with an idea, and you look for proof. It can be anything. And it always works."

Another hilarious session featured Richard Wiseman, Jon Ronson (author of *The Men Who Stare at Goats*, made into the movie with George Cooney), and Rebecca Watson recounting their CSI "Paranormal Road Trip." In this journey earlier that week by car from CSI headquarters in Amherst, New York, to the Nashville conference site looking for "paranormal" adventures they encountered a lot of "haunted houses" but nothing paranormal. Wiseman did find himself gobsmacked during a visit to the underground lair in Kentucky of a leading collector of magic memorabilia ("a cave full of magic"). There, neatly shelved eighty feet underground, he found one of only fifteen first editions of a 1902 book, *The Expert at the Card Table*, by someone known only by the pseudonym S.W. Erdnase. The book was far ahead of its time, said Wiseman, "the best sleight of hand ever." "We still don't know who wrote that book," Wiseman said. "It is a real mystery." The group's planned visit to the Creation Museum in Kentucky didn't happen. Recounted Watson: "They said yes, you can film. But you can't make fun of us. We ended up skipping it."

The visit by Richard Wiseman, Jon Ronson, and Rebecca Watson to the Creation Museum in Kentucky didn't happen. Recounted Watson: "They said yes, you can film. But you can't make fun of us. We ended up skipping it."

That evening, at the CSI Halloween Party, Wiseman was presented his earlier-announced CSI Balles Annual Prize in Critical Thinking (SI, September/October 2012), for the best skeptical book of the year, *Paranormality: Why We See What Isn't There.* On first thought the CSI Halloween Party might seem a strange venue for awarding Wiseman his prize. But maybe it all does fit. He seemed to relish it.

Sara Mayhew, the writer/illustrator of Manga-style graphic novels (see her cover article in the March/April 2012 SKEPTICAL INQUIRER) gave another entertaining talk, illustrated with her drawings. "I want to create a fandom-type feeling for skeptics and scientist heroes," she said. She noted that these comic versions of anime are a multimillion-dollar art form with a high female readership, about 70 percent in the U.S. "Good role models present a variety of different people. Manga does that.

Having more female role models is good for young men and males as well." She said one can apply the same goal to science role models.

"My goal is to combine my love of science and critical thinking with this emotional art form for people to connect." Like Indiana Jones ("a cool scientist role model") or the women in her stories, "We need more of these epic stories," but instead of "faith" and "believe" as themes, seen too often in other epics, "we can have a message of, 'How do we know about the world?' in an honest way. We need heroes who think their way out of crises, who care about the truth."

With two strong statements—"Just because you call something science doesn't make it so" and "There is no scientific evidence against evolution," Eugenie C. Scott of the National Center for Science Education began her report on the current status of evolution-creation disputes. At their root is that creationists mistakenly believe that "evidence against evolution equals evidence for creation," thus their continual attacks on evolution and their evolving strategies for undermining its teaching.

Statehouse legislatures are a prime target. About forty "Evidence Against Evolution" bills, also called "academic freedom" bills, exist in various stages. Two have passed, in Louisiana and Tennessee.

Creationists are masters at distorting the meaning of words. "If you see 'balanced' and 'evolution' on the same page, you know you are looking at a creationist document." Other euphemisms to look out for are "full range of views" and "teach the controversy." Says Scott: "To miseducate young learners does them no favors."

Most all these latest bills avoid mentioning religion, stress free speech, advocate teacher protection if teaching "alternatives" to evolution, and use permissive language ("allow" not "require"). "They are very clever the way they set up these bills."

What to do? Inform yourself, pay attention to your legislature and state and local school boards, and support good science standards and teaching. As for the

Economic Fraud: How Cons and Criminals Scam the Public

"What harm does it do?" That is the perennial challenge hurled at skeptics. What harm is there in people credulously believing in things that aren't true, that are too good to be true? When it comes to economic fraud crimes, the harm is self-evident. Money is lost, lots of it. Sometimes one's life savings, sometimes entire fortunes.

Psychologist Anthony Pratkanis, of the University of California, Santa Cruz, is deeply involved in this issue, and he gave a powerful presentation on the weapons of fraud—how cons and criminals scam the public. Americans alone lose $40 billion a year in telemarketing fraud, $110 billion in fraud generally. Worldwide, the totals are staggering.

There is no evidence for the myth of the weak victim. The weak and the strong are taken. And the evidence indicates that seniors are less susceptible, not more; they are just targeted more. Victims are more likely to have experienced a negative life event. And contrary to what you might expect, victims are more, not less, financially literate. They think they are immune. That makes everyone susceptible.

Social influence is the weapon in fraud crimes, Pratkanis emphasized.

He showed parts of a training video, "Weapons of Fraud," detailing how scam artists tailor their pitch to what makes you vulnerable. ("It's like cold reading.") They keep and share records of phone conversations. They use such weapons as phantom fixation (something you would like that is completely unavailable), social proof ("other people are winning"), false scarcity (about this rare 1860 coin, "There are only four left in the world"), authority, reciprocity, and a whole litany of others.

Can we stop it? Pratkanis described a project he and his psychologist colleagues have been working on with the FBI and other law enforcement authorities. It is called Santa Monica's Reverse Boiler Room. It involves identifying victims before the con is completed, calling them, and warning them. The reverse call center sends out prevention messages, giving people a coping strategy.

Ethical safeguards have been put in place, and the FBI is on-site to monitor. Victims are debriefed.

Does it work? "It has cut the victimization rate in half," says Pratkanis. "This is the first demonstration of an effective deterrent to this crime. . . . Forewarning works."

As a scientist, Pratkanis says he finds this work "exhilarating." But as a human being, "I got depressed. We can see how it [scamming] works. Yet it keeps going on and on."

His advice to others? "Develop those skeptical skills. Keep asking those critical questions." —K.F.

court cases so far, the news is good: "One hundred percent of the case law has been in favor of evolution."

A symposium on science and public policy was actually an update and elaboration of a controversy played out in recent issues of the SKEPTICAL INQUIRER: social science research into political beliefs as described in SI Contributing Editor Chris Mooney's 2012 book *The Republican Brain: The Science of Why They Deny Science—and Reality*, his SI article "Why the GOP Distrusts Science," and the ensuing controversy (letters in SI and Ronald A. Lindsay's somewhat critical review of Mooney's book in SI.) My introduction was a shorter form of what became my editorial "Can We Have Civilized Conversations about Touchy Science Policy Issues" in our January/February 2013 issue.

Mooney, knowing he was much the target of the ensuing two talks, began by noting that he is a science journalist covering the research on the subject. "I'm reporting on the research. So if you don't like the conclusions, don't blame me, blame the science." He reiterated that those studies show that "there's something unique about Republicans' view of science," and it involves "not just denial of science" but "denial of reality." He maintained that liberals and conservatives "have different personalities." Without even considering political content, key conservative traits are conscientiousness and order and stability while a key liberal trait is openness to new experience and new ideas. These traits explain much about the different parties' political views and their attitudes toward science. In his view conservatives' need for "cognitive closure" and a tendency toward authoritarian certainty and black-and-white views is antithetical to scientific thinking.

Dan Kahan, a professor of law and of psychology at Yale University, was first up. The essential problem all are concerned about, he said, is "the failure of valid and amply disseminated science to persuade." He offered "one good explanation" and four "not so good" explanations.

The good explanation, said Kahan, is what he calls "identity-protective cognition." It is simply this: "People have group allegiances that make them interpret science findings in different ways." Those ways consistently go in the direction of the values that protect their group identity. Other, not-so-good explanations include science denial, misinformation, a rationality deficit, and authoritarian personality. Science denialism fails as an explanation because views are divided along lines consistent with their group. People of each party "count someone as an expert when he has positions consistent with their cultural outlook." Both parties believe in being guided by a scientific consensus, "but they disagree on what that consensus is."

Lindsay recounted the evidence he amassed in his SI review calling into question Mooney's key conclusions. He concluded that one problem is that many of the studies Mooney cited may actually not be measuring conservatism.

Unfortunately, the session's time ran out before Mooney could give any real response, other than to say that he disagreed with virtually all of Lindsay's criticisms. Nevertheless, after the session they were seen sitting at a table together in what seemed amiable conversation, so perhaps, in this setting at least, the civility sought in the title of my SI editorial prevailed.

In his "The Science of Medicine" column in the November/December 2010 SKEPTICAL INQUIRER, Yale School of Medicine physician Steven Novella wrote tellingly about "The Misunderstood Placebo," and in his talk he returned to that topic.

The so-called placebo effect is a subjective-only effect, he said, not an objective one. It is manipulated by psychology only, not physiology. Most placebo effects are illusory effects that depend upon belief in getting traction. As for the often-vaunted "mind-body" connection? "Well, yeah," said Novella, "because it's the same option. What other option is there?" So-called "placebo

medicine" exploits the confusion about placebos. It makes vague use of the term "healing" and plays into the branding and marketing of "complementary and alternative medicine" (see adjacent sidebar about the pseudoscience in medical schools). An example of the exploitation of placebo confusion is the often heard statement that "Acupuncture works—as a placebo." That, said Novella, "just means that the outcome was negative." So what's the harm? Extolling a placebo is "installing bizarre, unscientific, mystical, nonscientific beliefs in patients."

In case you didn't know it, the world was supposed to end on December 21, 2012. The myth of an impending apocalypse on that date—drawing on everything from the Mayan calendar to supposed Sumerian or biblical predictions, to worries about comets or the nonexistent planet Nibiru, to pole shifts, planetary alignments, and solar flares—infected credulous websites across the Internet and worried the hell out of a significant share of the world's population (10 percent of Americans, according to a Reuters poll). Things got so bad that in the first week of December the Russian government put out an announcement that the world would not end later that month, and in the United States NASA did much the same thing.

Come to think about it, as I write up these notes in mid December, it's probably all for naught, but in the oft chance the world continues after the winter solstice, I'll continue. Planetary scientist David Morrison, as SI readers know, has been at the forefront of trying to rebut these rumors, providing accurate scientific information through NASA's "Ask an Astrobiologist" website, CSI's website, and in articles and other forums. He spoke at CSICon Nashville.

The whole thing would be silly and laughable except that Morrison gets pained messages from children

'Quackademic Medicine': Teaching Pseudoscience in Medical Schools

A problem of serious concern to skeptics these days is the rapid perfusion of pseudoscience into medical schools. This practice is eagerly promoted by proponents of so-called alternative medicine and increasingly allowed by a medical education culture not alert to what's at stake.

Prominent physicians in the skeptical movement brought the practice into the spotlight in a major CSICon symposium on the problem.

David Gorski and other concerned physicians see an increasing hostility toward science based medicine. One commentator even has called evidence-based healthcare "microfascism."

One good label for the infiltration of pseudoscience into medical schools is "Quackademic Medicine," a term coined by physician Robert W. Donnell. In the CSI symposium, cancer surgeon David Gorski, who edits the Science-Based Medicine website, used that term approvingly. He noted that quackery has undergone a linguistic evolution, a "major rebranding of quackery." What forty years ago was properly called "unscientific medicine" began to be called, in the 1970s and 1980s, "alternative medicine." (He considers that simply "unproven" and "often, disproven" practices.) "Complementary and Alternative Medicine" (CAM) came along in the 1990s, and now there is another rebranding: "Integrative Medicine." Gorski's succinct take? "Integrative medicine = science + magic."

Major medical schools like the University of Maryland and Georgetown have been integrating CAM throughout their curriculum and even into basic science courses. This has proven popular. "Bioenergetic medicine" is another new term, allowing the teaching of such nonscientific concepts as a "vital force" and "qi."

"This is the foot in the door . . . like the Trojan Horse," said Gorski. Harvard, Michigan, and the Cleveland Clinic are all welcoming these intrusions of questionable medical concepts into their curricula.

Often the cry is heard to "treat the whole patient." "This pisses me off," said Gorski. "That's what doctors already do," he notes. "And it creates a false dichotomy: You don't need to use quackery to 'treat the whole patient.'"

He and other concerned physicians see an increasing hostility toward science-based medicine. One commentator even has called evidence-based healthcare "microfascism."

Contributing to the problem is the relative indifference of most physicians, what Gorski refers to as a "shruggie," a person who doesn't care. "Most doctors just don't care."

"SkepDoc" Harriet Hall, a frequent SI contributor, said what's happening in medical schools is a reflection of what's happening in society overall. The view is, in short, "We don't need no stinkin' intellectuals" and "We don't need no education—we have Google." Other factors include the ideas that positive thinking makes it so and "my facts are as good as any others," a distrust for authority, looking for an easy solution, postmodernism (truth is relative), and a rising acceptability of doctor-bashing.

She told the story of a retired physician who took up acupuncture and soon found it working on everything. Wrote this doctor: "There is nothing like personal experience to convince one of an effect." Hall noted that he made a litany of common mistakes: confirmation bias, using biased sources, not recognizing how charisma can influence your view, cherry-picking the data, not understanding why science is necessary, relying on personal experience, the cause-effect fallacy,

the ancient wisdom fallacy, and relying on the personal experience of others. "The plural of anecdote is not evidence," Hall commented. She lamented that critical thinking is not taught in medical schools.

Kimball Atwood, another frequent contributor to SI and to Science-Based Medicine, reiterated Gorski's view that misleading language contributes to giving nonscientific and pseudoscientific medical practices a free pass. Terms such as "allopathic," "holistic," "complementary," "alternative," "integrative," and "Western" all mislead.

Atwood raised a reasonable question: "Why discuss implausible claims at all?" He believes medical schools should teach scientific skepticism. There are also important lessons in the history of medicine that can be taught, like the downfall of bloodletting and the "pre-scientific practices" that persist today, such as homeopathy, where teaching about Avogadro's number could help students understand homeopathy's innate implausibility. Skepticism, with its emphasis on logical fallacies and its insistence that clear thinking should trump pseudoscience, has great value.

As for worries that it may be impolite or impolitic to raise such issues, Atwood said, "Clear thinking should not be sacrificed on the altar of politeness."

It is a question of medical ethics, he emphasized: "Implausible treatments are unethical. Deceptive placebos are unethical. And human studies of highly implausible claims are unethical."

Eugenie C. Scott was the only non-physician who spoke. As executive director of the National Center for Science Education (and a physical anthropologist) she has great concerns about allowing more and more pseudoscience into medical schools. "It will miseducate students," she said. As for academic freedom, that is important, she noted, because it allows teachers to teach unpopular ideas and to challenge students. But there is also "academic judgment," she insisted.

"The issues are quite profound."

The Skeptical Inquirer plans a future article on how nonscientific concepts are making their way into the education of physicians. *—K.F.*

so caught up in these beliefs that they tell him they are contemplating suicide or killing their pets to spare them from the devastation.

Morrison recounted some of these messages and the "conflation of a variety of threads" of non-fact-based belief about all of it.

"None of these 'facts' is true," he emphasized. "No scientist supports any of these claims. None of these stories is covered in newspapers or TV." It has been almost entirely an Internet phenomenon.

As for a supposed galactic alignment, "I don't know what an alignment is. It's not a term used by astronomers. There is no alignment in December. There is no core of fact to this. These things are not going to happen."

Says Morrison: "It's all part of a mindset that believes in prophecy."

Morrison labels this new outlook "Cosmophobia—the fear of the end of the universe." People who believe it are getting all their "information" on YouTube and elsewhere on the Internet. The problem has been exacerbated by the fact that "science shows on cable TV have gotten a lot worse." Assuming short attention spans, the trend now, even on mainstream channels, is to be "hyper-exciting," with explosions, impacts, and so on every ninety seconds.

The conspiracy meme doesn't help, says Morrison. "People afraid of the government in one area have spread it to every topic."

Sharon Hill, using lively illustrations, spoke on "How to Think about Weird News." Hill, a geologist by training, does the *Doubtful News* blog and writes a column on CSI's website called "Sounds Science-y." (An SI article on that subject by Hill appeared in our March/April 2012 issue.)

"I'm a 'weird news' junky," she said. "Weird news is my favorite conversation topic." Weird news makes for a good story, she says: "Mystery is mongered. The wow factor is stressed. . . . TV and entertainment is our new misinformation highway."

Videos are hoaxed, birds fall from the sky, strange sounds are heard, dead carcasses of normal animals are claimed to be demonoids or monsters. Sharon Hill's site has a whole category called "underwater mysteries."

She considers the main audience for her Doubtful News site "the critical thinking community." The topics she examines are endless, the sources pitiful: "Real things entwined with wrongness." Videos are hoaxed, birds fall from the sky, strange sounds are heard, dead carcasses of normal animals are claimed to be demonoids or monsters. She has a whole category called "underwater mysteries." Then there are the quack cancer cures, always a problem for science-minded skeptics ("There is almost no way to write about them without sounding heartless"), bogus consumer products, and emotional appeals. You'd think it'd all tire Hill out. But she's still enthusiastic. "I'm pretty dedicated to not missing something good."

Scott O. Lilienfeld had the "honor" of being the conference's final speaker, but he performed his task so well no one's interest wavered. "It has been an

amazing conference," he said. He dedicated his talk to CSI founder Paul Kurtz, who, Lilienfeld observed, "was always respectful and gentlemanly."

Lilienfeld, a psychologist and member of the CSI Executive Council, spoke on "The Great Myths of Popular Psychology." He noted that "even for our brightest students, it's a confusing world out there." The pop psychology industry perpetuates myths, and no one is immune. For instance, 77 percent of his students begin by believing that schizophrenics have "multiple personalities," 63 percent think memory is like a video camera, 47 percent say memories don't change, and 61 percent think hypnosis is useful in solving crimes. This "naïve realism—the belief that the world is exactly as we see it"—is exemplified by the belief that eyewitness observation is always correct and in the often-heard (and often exactly wrong) phrases "seeing is believing" and "I know what I saw."

Lilienfeld ranged over a variety of examples of selective perception and memory, including illusory correlations (such as the repeatedly debunked idea that psychiatric admissions increase during the full moon) where "our brains are making the correlation." He ended by bringing up the troubling implications of some recent research. Debunking can be effective, these studies show, but it can also have backfire effects, reinforcing beliefs instead of disabusing people of them. "We need more than debunking; we need alternative accounts. . . . Spend more time telling what's true, not what's false."

It was good advice and a fine way to end a memorable conference.

The next CSICon will be at the same time next year (October 24–27, 2013) in Seattle/Tacoma. It will be a joint "Summit" conference of the Committee for Skeptical Inquiry and the Council for Secular Humanism, with a distinct skeptic track. See early announcement on our back cover.

Kendrick Frazier is a member of the CSI Executive Council and editor of the SKEPTICAL INQUIRER.

Gender Issues in Science: What's Different, What's Not?

Gender issues continue to gain attention and generate controversy. Good science, critical inquiry, and clear thinking all can help illuminate, not exacerbate, the issues. A morning session on gender issues explored the degree to which psychological differences between the sexes exist and to what degree they are hardwired or the result of culture.

Richard Lippa of California State University, Fullerton, offered a thoughtful examination of Janet Hyde's argument that there are not that many differences. He first looked at psychological differences. In the dimensions of agreeableness and neuroticism, women tend to be more highly represented. In the domain of mental illness, males tend to have such disorders as autism, mental retardation, reading disorders, and Tourette's syndrome, while women experience more depression by a 2:1 ratio and also tend to have more bipolar, panic, and conversion disorders. Among personality disorders, males tend much more than females to be antisocial or sociopaths. "So there are big differences in psychology," he said.

As for overall intelligence, any differences are small. One area where differences *are* big is along the people-things dimension. Men tend always to be more interested in things-oriented occupations, women in people-oriented occupations, and studies show that holds true over fifty-three nations. As for social behaviors, men tend to be more aggressive (10:1 male: female ratio of murderers).

Overall, between men and women, he said studies show that some differences are small, some differences are moderate, and some differences are large.

Psychologist Carol Tavris (author of such books as *The Mismeasure of Women*) next took the stage. "That was a terrific talk," she said of Lippa's presentation. "I have no differences with it. So I'm going to leave now!" The audience laughed. She proceeded.

She called for perspective ("either/or thinking is not going to get us anywhere") and a sense of history. She noted that women have come a long way since 1960. She reiterated, "I completely agree with Richard regarding psychological differences." But she said many sex differences have flipped over in the past decade or two. "The problem is *stereotypes*." She cautioned against "taking snapshots that assume differences at any time tell us about *fundamental* differences." Another caution is that in surveys "what people *say* has little to do with how they *behave*. . . . You don't see the major differences when you look at *behavior*."

Many sex differences have flipped over in the past decade or two.

As an example, she said if you define aggression as "intention to harm," you don't see sex differences. "We just express it in different ways. . . . Women are likely to ruminate more than men." As for brain differences, there are indeed many anatomical and activity differences in men/women brains, but it all comes down to "so what?" She pointed to three general problems with generalizing about brain differences: There is no correlation with behavior, brains are complex, and each brain is unique.

What is the future of sex differences, and where are we going from here? Tavris summarized things this way. A lot in society is changing. It's women who are getting the educations. We are seeing huge differences in economic status. Women are now earning more, getting better educated, and getting better jobs, so many are delaying marriage. "The whole planet is becoming Sweden," is how she put it. Changes are being caused by the global economy and circumstances.

A memorable moment came when a man in the audience concerned about how to think about gender differences asked Tavris for advice about raising his daughter. She replied succinctly: "Enjoy the ones that matter, ignore the rest." —*K.F.*

Joe Nickell, PhD, is CSI's senior research fellow and author or coauthor of such books as *Tracking the Man-Beasts, Entities*, and *Lake Monster Mysteries*.

Scotland Mysteries–Part I: The Silly Ness Monster

Following the excellent skeptics' conference, QED ("Question. Explore. Discover."), in Manchester, England, March 10–11, 2012—where I was the closing speaker and a cryptozoology panelist—I went on an investigative jaunt with British skeptic and investigator Hayley Stevens and her father Andy, who is a photographer and professional driver and guide. Here I focus on the Scotland portion of our tour, beginning with the enduring case of the Loch Ness Monster.

The Lair

Located in the Scottish Highlands, and stretching for almost twenty-three miles, is a narrow, trench-like basin, 227 meters in depth at its deepest point, holding the greatest volume of fresh water in all of Britain. This is the world's most famous lake, Loch Ness, home to the world's most famous—and least terrifying—legendary lake monster. "Nessie" is best known from a 1934 photograph, showing it as a long-necked, small-headed, plesiosaur-like creature but in fact proving to have been a hoax made by photographing a small model (Nickell 1995, 242).

Now, it is not true that Loch Ness is unique among Scottish lakes, or even nearly so, in having a resident monster. Whereas one writer claims there are only two others in Scotland, Loch Morar and Loch Tay, Ronald Binns (1984, 183n) observes that there are "not three but dozens of 'Lochs na Beiste,'" including one we had lunch beside, Loch Lomond. Admittedly that lake has little monster tradition, consistent with the statement of a gentleman we encountered there; he announced emphatically that there was "no monster." He is probably correct, although some locals speak of "Lomonda" who never caught on ("Balloch and Loch Lomond" 2006). Loch Ness is of course a different story.

When I wondered aloud whether rifles would be available to Nessie hunters, a boat hand quickly answered that, no, harpoons would be issued "when needed."

Water Kelpies

The earliest recorded encounter with Nessie is told in *The Life of St. Columba*. Supposedly Columba (a Christian missionary, 521–597 CE) sent a man to swim across the River Ness to retrieve a boat, when he was approached by the monster. The future saint quickly "formed the sign of the cross in the empty air" and commanded the creature to go back, whereupon it fled. That is a saint's legend—one of a genre of narratives that are intended to demonstrate the power of God and that are notoriously incredible. Moreover, the account was written circa 700 CE, well over a century after the events they purport to describe (Shine 2006, 6; Coulson 1958, 134).

Many Scottish legends tell of kelpies or water-horses, supernatural water creatures that prey on humans. "Their trick," states Stuart McHardy, in his *Tales of Loch Ness* (2009, 52), "was to appear as a wandering horse and induce one or more humans to climb on their backs. Then they would make straight for their watery home and dive in, their supernatural powers keeping the humans on their backs as if glued." (See also Leach 1984, 573.)

Today, kelpies are relegated to the distant past, but as recently as July 1, 1853, the *Inverness Courier* reported the sighting of two strange animals. Some thought a single sea serpent was coiled at the surface, while others suspected a pair of whales or large seals. (The sighting was at Lochend, a village near the sea-connected northeastern end of the lake, where such animals might make their way.) However, on seeing the creatures, a "venerable patriarch" threw down his gun, shouting, "God protect us; they are the Water Horses." He was

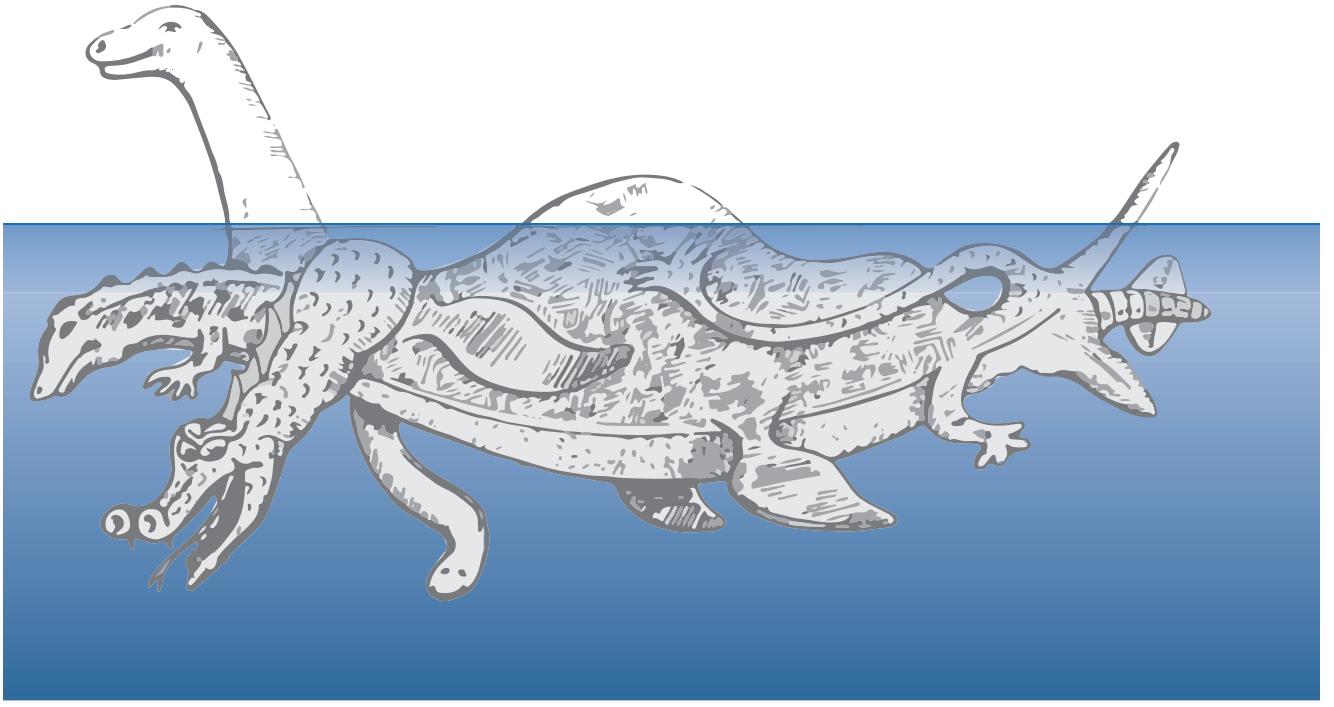


Figure 1. A composite iconographic portrait of Nessie—a metamorphosing, contortionistic, chameleonlike creature, or the product of various monster lookalikes and misperceptions. (Illustration by Joe Nickell)

partly right: they turned out to be ponies that had wandered from an estate more than a mile distant (Shine 2006, 6).

Looking back, it is easy to see that any of several creatures might have given rise to water-horse sightings—in addition, of course, to actual horses and ponies! Other possibilities are the occasional swimming roe deer, which lack true antlers but instead have short double-pronged horns (Binns 1984, 191–93), and the sturgeon, with its long muzzle. Says naturalist Adrian Shine (2006, 28), "If ever a fish had a horse's head it would certainly be the Sturgeon."

Rounding Up Suspects

On our four-day excursion to Loch Ness, we found the locals to be quite playful regarding the "monster." For example, at the Glen Ord distillery where I told a tour guide we had come to the area to hunt Nessie, the woman quipped that we were quite right to make a distillery our "first stop." In booking passage on a sonar-equipped boat to tour the loch, I asked if this were where we got our hunting license for the monster, to which a ticket seller dead-panned that we would have better luck hunting Nessie on land—meaning where the toy creatures are sold. And on the boat itself, when I wondered aloud whether rifles would be available to Nessie hunters, a boat hand quickly answered that, no, harpoons would be issued "when needed."

More seriously, we made several inquiries. An information officer in Inverness told us she had seen seals in the River Ness, which passes through the city, linking the loch with the North Sea. Seals are among the monster lookalikes that are endemic either to the Loch or its environs. Although the sturgeon is now almost extinct in Scottish waters, one could have occasionally entered the loch to become, say, the "huge fish" of 1882. Additional potential "monsters" are salmon and other fish, swimming deer, long-necked water birds, bobbing logs, boat wakes, wind slicks, and more (Shine 2006).

Then there is the large European otter (*Lutra lutra*). Otters resemble seals, and both are able to appear on land. However, otters also appear in rivers and lakes that are not accessible to seals. The otter's long neck and undulating movements can give it a monsterlike look (Binns 1984, 186–91). This is especially so when two or more are swimming in line, as they do because they enjoy "chasing each other" and "following the leader" (Godin 1983). They can thus appear as a single long-necked, multi-humped creature. This illusion was observed as early as 1930 in the Scottish river Clyde, and it has since been confirmed elsewhere (Gould 1934, 115–17; Nickell 2007, 6–7). (It is the basis for a delightful children's tale titled "Otterly Impossible." The story is in *Fairy Tales Fairly Told* by Barbara Mervine, with illustrations by Noah

Figure 2. Investigator Hayley Stevens monitors sonar scans aboard an excursion boat on Loch Ness. (Photo by Joe Nickell)

Whippie, a foreward by James Randi, and inspiration for the Ness tale credited to yours truly.)

Iconography

The iconography (or study of images) of the Loch Ness Monster is illuminating. From St. Columba's "Water Beast"—with "gaping mouth and with great roaring"—and Scottish folklore's horse-headed kelpie, to the plesiosaur-like creature of the 1934 hoax photo, the monster has continued to evolve. It has since been described as six to 125 feet in length; shaped like a great eel of a creature with up to nine humps; colored silver, gray, blue-black, black, or brown; and endowed—or not—with flippers, fins, mane, horns, or tusks (Binns 1984; Gould 1934).

No doubt the extremely diverse descriptions are explained by the differences in Nessie lookalikes—as well as the vagaries of eyewitness evidence. The infamous 1934 hoaxed photo obviously did much to influence the developing portrait, although paleontologists have since postulated that plesiosaurs were unable to raise their long necks (Shine 2006, 11). In Figure 1, I have compressed the iconography of Nessie into a single humorous image that, I trust, makes an effective point.

Nessie Hunters

At the Loch Ness Exhibition Centre in Drumnadrochit, we received the generous attention of Adrian Shine, the venerable naturalist and Loch Ness expert, who has been a Nessie hunter since 1973. The Centre is brilliantly conceived, a wonderful science museum disguised as a Nessie exhibit. It teaches continental drift, evolution, perception, and a number of other scientific matters while skeptically—but tactfully—discussing the famous monster. Shine's book *Loch Ness* supplements the tour with fascinating data and pictures—including one that remarkably recreates the previously mentioned 1934 hoaxed photo (2006, 11).

We also arranged to meet Steve Feltham, who has a little trailer on the loch at the village of Dores (near the inn, which serves delicious haggis). The world's only full-time Loch Ness Monster hunter, Feltham is the most interesting Ness creature I encountered. Having lived on the Loch since 1991, he supports himself by selling whimsical little Nessies (made of polymer clay and baked in his oven), along with driftwood art and watercolor paintings. An intelligent, thoughtful man, Feltham is no knee-jerk believer, having many times explained a tourist's sighting as, for instance, a boat wake's delayed arrival. Most recently he branded a photo of Nessie a hoax (involving a fake fiberglass hump used to film a National Geographic documentary ["Loch Ness" 2012]). He told us that even if there were no monster legend, he would still have his beachcomber life— "only in a warmer place!"

The world's only full-time Loch Ness Monster hunter, Steve Feltham is the most interesting Ness creature I encountered.

A highlight of the trip, and of my years of work as a skeptical cryptozoologist (with many appearances as such on TV series like National Geographic's *Is It Real?*, History Channel's *MonsterQuest*, and Animal Planet's *Lost Tapes Series*), was my time spent surveying the loch's waters, especially near Urquhart Castle, the location of many sightings. Our boat crossed the loch from the opposite shore to the castle and back, while Hayley and I alternated between searching the waters and monitoring sonar scans (see Figure 2). Alas, as so often is the case, Nessie was a no-show. ■

("Part II: Ghosts, Fairies, and Witches" will appear in the next SI.)

Acknowledgments

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[THINKING ABOUT SCIENCE MASSIMO PIGLIUCCI

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The Proper Role of Sociology of Science

This semester I have been teaching a graduate class on the so-called "science wars" of the 1990s and early 2000s, and in particular on the differences between philosophy of science and so-called "science studies" (a somewhat heterogeneous ensemble of sociology of science, feminist epistemology, social criticism, deconstructionism, and a few other things). My attention has therefore been drawn back to the fundamental tenets of the "strong programme" in the sociology of scientific knowledge, also known as SSK. One of its founders, David Bloor, summarized them as follows:

> 1. [The program] would be causal, that is, concerned with the conditions which bring about belief or states of knowledge. Naturally there would be other types of causes apart from social ones which will cooperate in bringing about belief.
>
> 2. It would be impartial with respect to truth and falsity, rationality or irrationality, success or failure. Both sides of these dichotomies will require explanation.
>
> 3. It would be symmetrical in its style of explanation. The same types of causes would explain, say, true and false beliefs.
>
> 4. It would be reflexive. In principle its patterns of explanation would have to be applicable to sociology itself.

Go ahead, re-read the list and see if you can spot the problem. It's number three, the clause about symmetrical explanations. To see why, consider the case in which we are trying to explain why young-Earth creationism is a favorite position among the American public, contrasting it with why the scientific community at large thinks instead that Earth is billions of years old. As a philosopher of science, I would want to invoke an asymmetry in the two cases: the first is an instance of pseudoscience, the second of actual science. The first belief is—to the best of our knowledge and abilities—wrong, while the second one is at least approximately correct. You would think that part of the explanation for the difference between the two beliefs has to do with the truth of the latter and the falsity of the former (in agreement, incidentally, with the second part of number one above). If so, then scientists believe in an old Earth because the best evidence available to us points to the *truth* of that belief. On the contrary, the fact that a large section of the American public believes in a young Earth is *epistemically anomalous* (i.e., it doesn't have rational standing based on evidence), and it is therefore likely to have sociological (and psychological) explanations, for instance of the type traced by sociologist Richard Hofstadter in his 1964 classic, *Anti-Intellectualism in American Life*.

The fact that a large section of the American public believes in a young Earth is *epistemically anomalous* (i.e., it doesn't have rational standing based on evidence), and it is therefore likely to have sociological (and psychological) explanations.

This sensible solution is precluded to the SSK approach by the symmetry clause. The idea is further explained by sociologist Trevor Pinch: "We ask not why science is more true than other accounts of the world . . . but rather how do scientists reach agreement about what *counts* as truth." Ahem, yes—but

shouldn't (approximate, provisional) truth figure somewhere into that account? No, says Pinch, because "We try to avoid explaining the emergence of truth by reference to its truthfulness because such explanations are circular."

Now, avoiding circularity is a commendable goal, most certainly in line with anything a reasonable philosopher would suggest. But if you go back to the quotes above you may notice a sleight of hand: Bloor's goal (shared by Pinch) is to explain *belief*, not *truth*. If so, then there is no circularity at all involved in explaining some beliefs by invoking their (likely) truth, and indeed in distinguishing them from other beliefs on the basis that the latter are (likely) untrue. Why wouldn't proponents of the SSK adopt this time honored and eminently commonsensical approach to belief formation, then?

Because they would have much less to say about scientific knowledge, the most prized of their targets. After all, sociologists are typically in no position (as in fact acknowledged on several occasions by both Bloor and Pinch) to adjudicate disputes in natural science. That's the job of the natural scientists themselves, as well as the meta-job, so to speak, of philosophers of science (in their role of epistemologists). The scope of sociology, then, would be limited to the (partial) explanation of why some people happen to believe things that are not true. Apparently, this respectable and indeed useful contribution of sociology is not enough for proponents of SSK, who wish to arrogate for themselves a much broader role, one that they cannot justify other than by invoking the symmetry postulate, thus becoming the lightning rod for the scorn of scientists and philosophers of science alike. (And, I would hope, of skeptics!)

None of the above argues for not doing sociology of science, of course. Scientists themselves—either individually or as a group—sometimes do hold untrue beliefs for nonrational reasons, and sometimes do so for decades (just think of eugenics, or Piltdown man). In *those* cases science and philosophy of science can point out why such beliefs were epistemically unwarranted but cannot explain why they were held, at times widely, nonetheless. That explanation becomes then the province of psychology (for individual beliefs) and sociology (for socially widespread beliefs). The resulting picture is one where natural scientists, philosophers, psychologists, and sociologists work together to provide a full account of both true and untrue (or, to be more precise, warranted and unwarranted) human beliefs. Can't we all just get along? ■

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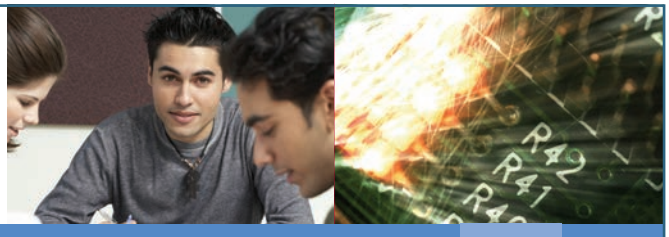
SCIENCE AND THE PUBLIC



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UFOs Infest Denver, Says Fox TV Affiliate

Some critics have long accused Fox News and its affiliates of practicing tabloid journalism. The Fox affiliate in Denver, KDVR, seems determined to prove them correct. On November 8, they broadcast a video of an ill-defined, very fast-moving object that they described as a "mile high mystery," proclaiming, "nobody can explain what it is" (http://tinyurl.com/KDVRfly). There's only one problem: This "UFO" is obviously an insect—probably a fly.

KDVR received some supposed "UFO" videos from a man who does not want to be identified, which to any seasoned reporter should immediately raise a red flag. The videos were taken on a hilltop in Federal Heights, at 84th Ave. and Federal Blvd., looking south toward downtown Denver. The "UFOs" appear at least several times a week, we are told, usually around noon to 1 PM (perhaps not coincidentally, around the warmest part of the day when most flying insects become more active). The anonymous photographer, who has been filming these objects for months, believes that the UFOs are being "launched" from someplace around 56th Ave. and Clay St. in Denver, which is a residential area.

The "UFO" is said to be flying too fast to be seen by the naked eye, and it's necessary to slow down the video. The object is seen to dive down toward the ground, between the ground and the camera (for example, at 1:29 into the video; also at 1:40 and 2:40). As in the case of other fly UFO videos, we are not shown the entire, unedited video. If we were, it would very likely be obvious how small the object is when it is seen clearly against the nearby ground.

The "investigative reporter" Heidi Hemmat contacted an aviation expert, Steve Cowell, who is described as "a former commercial pilot, instructor and FAA accident prevention counselor." As far as I can tell, these qualifications have nothing to do with optics, video photography, still photography, insects, or, for that matter, UFOs. Cowell proclaimed, rather self-evidently, that the object was no kind of aircraft, helicopter, or bird. Hemmat said that Cowell also proclaimed that it wasn't an insect, although he later disputed this. The FAA and NORAD were consulted, and both reported that there was no air traffic in that area. "And it's not a bug," said Hemmat, "people keep saying it's a bug." Perhaps you should investigate that possibility? But no, an "expert" has spoken, and Hemmat would never question that. If I had a nickel for every time some "expert" said something idiotic about UFOs, I'd be rich.

KDVR sent its own cameraman to the spot, and he, too, photographed at least one fly. This was taken as confirmation that mysterious UFOs are indeed buzzing around Denver on a regular basis. This story is a serious contender for the stupidest news report of 2012, although there is a lot of stiff competition for that honor. CNN and other news outlets soon picked up the story as well.

Obviously delighted by all the attention its tabloid story received, on November 20 KDVR did a second report on the fly UFO (http://tinyurl.com/KDVRfly2). This time they consulted an entomologist, Mary Ann Hamilton,

best known as an expert on butterflies. After watching the video, she said, "I do not believe it's an insect. The shape is inconsistent with an insect." She does not say whether she is familiar with still-frame video representations of out-of-focus moving objects. Meanwhile, skeptics from the Rocky Mountain Paranormal Research Society went to the supposed UFO spot and found plenty of people already sitting there, looking for UFOs themselves! They set up a video camera and recorded fly UFOs too. One UFO even flew between the camera and a cardboard screen they had set up about ten feet away (http://tinyurl.com/bpoq44v). That's a tiny UFO indeed!

UFO author Leslie Kean noted on her Facebook page, "The object in these [KDVR] videos looks like the one from Chile at the El Bosque AF Base." This is the Chilean fly UFO video she has been promoting as being perhaps "the case UFO skeptics have been dreading" (see this column, SI, July/August 2012). It started a huge controversy as even many UFO proponents argued it was just a bug. It only took months of analysis and *two* trips to Chile to meet with the promoters of the celebrated fly UFO video, the CEFAA, the Chilean equivalent of the American FAA, but she finally has reached a conclusion: there is no conclusion (http://tinyurl.com/keanfly2). One UFO "photo expert" concluded it was indeed a bug, while another concluded it couldn't possibly be one. Kean is quite content to pronounce the identity of the object unknowable, a controversy at the fringes of scientific knowledge: "Each of us can form our own opinions about something that science cannot determine, or we can simply accept that we will likely never know." Absurd! This is not rocket science—the object is just a fly, and it turns up on other videos taken at the same spot!

At least Kean did finally throw in the towel October 17 on Facebook concerning the now-confessed Belgian hoax photo from Petit-Rechain (see this column, SI, January/February 2012). Touted as solid UFO evidence in her book *UFOs: Generals, Pilots and Government Officials Go On the Record*, she concedes, "Yes, this photo seems to be a fake, unfortunately. Belgian researchers have looked into it. I have to update this in my book." Well, I guess that's a step in the right direction. There are still a few dozen other UFO cases in her book that need to be acknowledged as mistakes or as hoaxes, but then she wouldn't have much of a book left.

This is not rocket science—the object is just a fly, and it turns up on other videos taken at the same spot!

* * *

There are new developments in the famous supposedly UFO-related disappearance of Fredrick Valentich, a twenty-year-old pilot in Australia. On October 21, 1978, he was piloting a Cessna 182L light aircraft over Bass Strait. He intended to land at King Island and return to Moorabbin Airport. However, he never made it to King Island, 127 miles away. Some of the final exchanges between Valentich (DSJ) and Melbourne Flight Services (FS; Robey) are as follows (from Wikipedia):

> 19:06:14 DSJ: Melbourne, this is Delta Sierra Juliet. Is there any known traffic below five thousand?
> FS: Delta Sierra Juliet, no known traffic.
>
> DSJ: Delta Sierra Juliet, I am, seems to be a large aircraft below five thousand.
>
> 19:06:44 FS: Delta Sierra Juliet, What type of aircraft is it?
>
> DSJ: Delta Sierra Juliet, I cannot affirm, it is four bright, and it seems to me like landing lights…
>
> 19:08:48 DSJ: Delta Sierra Juliet, it seems to me that he's playing some sort of game, he's flying over me two, three times at speeds I could not identify.
>
> FS: Delta Sierra Juliet, roger, what is your actual level?
>
> DSJ: My level is four and a half thousand, four five zero zero…
>
> 19:10:19 DSJ: Delta Sierra Juliet, Melbourne, it seems like it's chasing me. What I'm doing right now is orbiting and the thing is just orbiting on top of me also. It's got a green light and sort of metallic like, it's all shiny on the outside…
>
> FS: Delta Sierra Juliet, is the aircraft still with you?
>
> DSJ: Delta Sierra Juliet; it's (open microphone for two seconds) now approaching from the south-west.
>
> FS: Delta Sierra Juliet
>
> 19:11:50 DSJ: Delta Sierra Juliet, the engine is rough-idling. I've got it set at twenty three twenty-four and the thing is (coughing)…
>
> 19:12:28 DSJ: Delta Sierra Juliet. Melbourne (open microphone for seventeen seconds).

It was Valentich's first and only night flight over water. Neither Valentich nor his aircraft was ever seen or heard from again.

At last we have some new information on this puzzling case: "Adelaide researcher Keith Basterfield has been following the case since the disappearance in 1978, but had been told by the Government in 2004 the official file had been lost or destroyed. He 'found' it when searching through an online National Archives index on an unrelated topic. The file has since been digitized and uploaded on the archive's website" (http://tinyurl.com/butdpmv).

So we have skeptic Keith Basterfield to thank for the recent government "document dump" that makes this new information available. Basterfield explains that the newly released files reveal that "parts of aircraft wreckage with partial serial numbers were found in Bass Strait five years after the disappearance." Also, one pilot searching at the right time and place saw debris that appeared to be from a Cessna, but before he could get a good fix on its position it apparently sank. This makes it extremely likely that Valentich's aircraft simply crashed into the water in the darkness.

There is a nice summary of these findings in Basterfield's blog entries of June 28, July 3, and August 24, 2012 (http://ufos-scientificresearch.blogspot.co.uk/). You can download the first set of documents from scribd (http://tinyurl.com/c95hmza). From the documents:

> A number of reports of a fast moving brilliant white light were received from various parts of the country. Mt Stromlo observatory advised that the night of the 21st was the peak of the meteorite stream with 10-15 sightings per hour achieved.

The question of why Valentich took this somewhat risky night flight is a separate matter. According to Wikipedia:

> His stated intention was to fly to King Island in Bass Strait via Cape Otway, to pick up passengers, and return to Moorabbin. However, he had told his family, girlfriend and acquaintances that he intended to pick up crayfish. During the accident investigations it was learned there were no passengers waiting to be picked up at King Island, he had not ordered crayfish and could not have done so because crayfish were not available anyway.

So clearly Valentich was being evasive about something. His stated explanations for making his night flight do not check out. Also, it turns out that Valentich was a UFO "True Believer," and hence probably inclined to assume anything is a "UFO" if he could not immediately identify it. He actually worried about what to do if a UFO attacked him!

Also, it turns out that Valentich was a UFO "True Believer," and hence probably inclined to assume anything is a "UFO" if he could not immediately identify it.

Various air safety organizations, including the Aircraft Owner and Pilots Association, have a pilot education lesson titled *178 Seconds to Live*; you can watch it as a video at http://tinyurl.com/178seconds. The title comes from a study that found (using flight simulators, of course) that when non-instrument rated pilots are placed in situations where they cannot see the ground or the horizon, nearly all of them got into a fatal spiral and crashed, with an average time-to-crash of 178 seconds. Watching this video made my blood run cold, but it's absolutely realistic.

This is exactly the situation Valentich found himself in when darkness fell on that moonless night (as did John F. Kennedy Jr. in 1999). Assuming that he became disoriented and thought that Venus, or perhaps a meteor, was a UFO—he says it was "orbiting" him—we would expect him to crash in about 178 seconds. He actually survived 374 seconds from the time of his first UFO report until crashing. Valentich had a "Class Four Instrument Rating," but we know he was not watching his instruments; his eyes were fixed on the "UFO" he was describing. We also learn from Wikipedia that Valentich

> had twice applied to enlist in the Royal Australian Air Force but was rejected because of inadequate educational qualifications. He was a member of the Air Training Corps, determined to have a career in aviation. His student pilot license was issued 24 February 1977 and his private pilot license the following September. Valentich was studying part-time to become a commercial pilot but had a poor achievement record, having twice failed all five commercial license examination subjects, and as recent as the previous month had failed three more commercial license subjects. He had been involved in flying incidents, straying into a controlled zone in Sydney (for which he received a warning) and twice deliberately flying into cloud (for which prosecution was being considered).

I would never knowingly get into an aircraft with a pilot like that—and especially not for a night flight over water! We can be quite sure of what happened to the incautious Valentich, even if we cannot say why he made that fatal flight.

Steven Novella, MD, is assistant professor of neurology at Yale School of Medicine, the host of the *Skeptics' Guide to the Universe* podcast, author of the *NeuroLogica* blog, executive editor of the *Science-Based Medicine* blog, and president of the New England Skeptical Society.

Herbs *Are* Drugs

Herbal supplements are big business. In the United States alone, 2011 sales of all herbal products were estimated to be $5.3 billion (Blumenthal et al. 2012). Meanwhile the industry has managed to maintain a "mom and pop" image to the public, the righteous underdog constantly under attack by Big Pharma. In reality, the herbal product industry is just another drug industry, one selling products that are poorly regulated and likely don't work for their claimed indications.

There are already a fair number of scientific studies looking at various herbal products for specific indications. There is nothing inherently implausible about the usefulness of plant-based remedies. Many modern drugs are derived from plants. Plant parts contain many substances, some of which are pharmacologically active and can be exploited for medical use.

The deception inherent to the herbal product industry, in my opinion, is the notion that herbs are something other than drugs. This is closely tied to the naturalistic fallacy: the idea that a substance that is "natural" (a poorly defined concept) is somehow magically safe and effective.

In reality, herbs often contain multiple active ingredients that potentially have drug-like activity in the body. These drugs are often poorly understood, may not even be identified, and exist in highly variable doses within herbal products (Wurglics et al. 2001). Herbs have drug-drug interactions and the same potential for side effects and toxicity as any drug, mitigated only by the fact that herbal products generally contain low doses of active ingredients.

Some popular herbal products have been studied in standard placebo-controlled trials, and they have generally not fared well. A recent scientific study published in the *Journal of the American Medical Association*, for example, looked at the drug silymarin for the treatment of liver disease due to chronic hepatitis C that has not responded to standard therapy with interferons (Fried et al. 2012). Silymarin is an extract of milk thistle, an herb commonly used to treat liver disease.

There have now been large, double-blind clinical trials of echinacea and cold symptoms (Barret et al. 2002; Taylor et al. 2003; Turner et al. 2005), Gingko biloba and memory loss or Alzheimer's disease (Snitz et al. 2009), black cohosh and hot flashes (Newton et al. 2006), saw palmetto and benign prostatic hypertrophy (Tacklind et al. 2009), and others. Even St. John's Wort, which is supposed to be a big herbal remedy win, has been shown to have no effect on moderate or severe depression (although the jury is still out on minor depressive symptoms; see Hypericum Depression Trial Study Group 2002). Many of these studies were funded by the National Center for Complementary and Alternative Medicine (NCCAM).

Despite this string of negative studies, the herbal remedy industry continues to rake in billions of dollars every year. Large, rigorous, and negative studies seem to have little impact on the sales of herbal products overall (although they may affect the relative popularity of specific herbs to some extent).

To make matters worse, in the United States herbal drugs were essentially deregulated in 1994 by the Dietary Supplement Health and Educa-

Here are some useful tips for the potential herbal product user:

- Don't be reassured by claims that a product is "natural"
- Traditional use, whether genuine or not, is not by itself a good predictor of safety or effectiveness
- Find out what the best scientific evidence says, and seek out critical information specifically
- Respect the fact that herbs are drugs, which means:
  - They can cause toxicity and side effects
  - They can interact with other drugs you are taking
  - You should inform your physicians about any herbal products you are taking (just as you list your prescription medications)

tion Act (DSHEA). Herbs are now regulated more like food rather than drugs. Further, a special category of health claims, so-called structure function claims, was carved out for supplements. Companies can market herbs without any prior approval from the FDA or need to provide evidence of safety or effectiveness. They can even claim that their product supports the structure or function of the body in some way, as long as they don't mention a specific disease by name. This amounts to a massive loophole easily exploited by any savvy marketer.

In reality, the herbal product industry is just another drug industry, one selling products that are poorly regulated and likely don't work for their claimed indications.

The deal that DSHEA and NCCAM made with the public was this: Let the supplement industry have free reign to market untested products with unsupported claims, and then we'll fund reliable studies to arm the public with scientific information so they can make good decisions for themselves. This "experiment" (really just a gift to the supplement industry) has been a dismal failure. The result has been an explosion of the supplement industry flooding the marketplace with useless products and false claims.

Part of the problem is that negative studies are too easy to dismiss. In every case the supplement industry finds some reason to minimize the implications of the studies showing their products do not work, instead preferring to cherry pick small and unreliable studies with positive results. No study can possibly address every possible permutation of how an herb can be used.

For example, herbal apologists may claim that the dose was not high enough, the wrong part of the plant was used, the preparation was not correct, or the treatment population was wrong in some way. For echinacea they claimed that the wrong cold viruses were used. There is always something they can point to. Of course, this logic works both ways: if it's so difficult to find the right preparation for the right condition, then how do they justify selling highly variable products to the general population with broad claims?

How are the "traditional" uses of herbal products derived in the first place? The impression that is often given is that centuries of successful traditional use is behind many herbal product claims, but this is often a modern marketing fiction.

It seems reasonable to require manufacturers and marketers of herbal products to prove that their products are safe and effective for whatever it is they claim they treat. Not only is this not required under DSHEA, companies can continue to market their herbs with claims that have been contradicted by major scientific studies funded by taxpayer dollars.

As with many things, the marketing of herbal products is largely based on ideology and a compelling narrative rather than actual science and evidence. For the most part consumers are left to their own devices to sort out which products are likely to be useful.

Finally, keep in mind that if an herbal product contains a useful active ingredient, it would likely be identified, purified, and properly studied. The best result is likely to come from taking a precisely measured amount of a specific active ingredient with known pharmacokinetics and pharmacodynamics as well as drug-drug interactions.

Herbs are not only drugs, they are a mixture of various drugs of unknown dose, activity, and interactions, often with evidence that they do not work. It takes effective marketing to convince the public this is somehow better than taking highly purified and studied pharmaceuticals. ■

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Innate Morality? Babies Weigh In

In 1762, Rousseau characterized the human baby as "a perfect idiot." In 1890, William James judged the infant's mental life to be "one great blooming, buzzing confusion." We've learned much about early human cognition since the nineteenth century, of course, and the current trend is to assign well-expanded mental capacities to young children. But intellectual battles continue to rage, for example, over the possibility of an innate and perhaps nuanced moral sensibility.

Indeed, psychologists split this past summer over the question of whether pre-verbal infants are capable of evaluating the social value of others. Back in 2007, Yale University researchers led by J. Kiley Hamlin claimed to have demonstrated that infants can morally assess individuals based on their behavior toward third parties (Hamlin et al. 2007). Those findings were challenged last August, however, by postdoctoral research fellow Damian Scarf and his colleagues from the University of Otago in New Zealand (Scarf et al. 2012).

Hamlin's pioneering study deployed three experiments on six- and ten-month-old babies to test her team's hypothesis that social evaluation is a universal and unlearned biological adaptation. In all trials, infants observed characters shaped like circles and either squares or triangles moving two-dimensionally in a scene involving an artificial hill. Parents held their children during the program but were instructed not to interfere.

In experiment one, the characters were endowed with large "googly eyes" and made to either climb the hill, hinder the climber from above, or help the climber from below. With looking times carefully measured, the infants observed alternating helping and hindering trials. The question here was whether witnessing one character's actions toward another would affect infants' attitudes toward that character.

When encouraged to reach for either the helper or the hinderer, twelve of twelve six-month-olds and fourteen of sixteen ten-month-olds chose the helper. But might the babies have responded to superficial perceptual, rather than social, aspects of the experiment? For example, perhaps the infants merely preferred upward or downward movements. In an attempt to rule out that possibility, Hamlin modified a single test condition and gathered a second group of children.

In experiment two, the object pushed was represented as inanimate. Its googly eyes were detached and it was never made to appear self-propelled. If the infants had chosen based on mere perceptual events in the first experiment, Hamlin proposed, they should express an analogous preference for the upward-pushing character in the second. But that didn't happen. Only four of twelve six-month-olds and six of twelve ten-month-olds picked the upward-pushing shape.

So the team decided that three possibilities remained. The infants might positively evaluate helpers, negatively evaluate hinderers, or both. To determine which, Hamlin assembled a third group of children, reattached the googly eyes, and altered the experimental design to include a neutral character that would never interact with the climber.

In the final experiment, children first observed either a helper or a hinderer interact with a climber as in experiment one. Thereafter, they witnessed a neutral, non-interactive character that moved uphill or downhill in the same way.

When prompted to choose, infants reacted differently toward the neutral shape depending on the character with which it was paired. Seven of eight babies in each age group preferred the helper to the neutral character and the neutral character to the hinderer. Hamlin thus inferred that her subjects were fond of those who facilitate others' goals and disapproving of those who inhibit them.

"Humans engage in social evaluation," the Yale researchers concluded, "far earlier in development than previously thought." The critical human ability to distinguish cooperators and reciprocators from free riders, they agreed, "can be seen as a biological adaptation."

Having viewed recorded portions of these experiments, I felt compelled to question some of the program's most basic assumptions and methods. Can infants fathom, for instance, what artificial landscapes represent, or what "hills" look like? Can they grasp the symbolic significance of squares, triangles, and circles adorned with "googly eyes"?

Although groundbreaking in its own right, Hamlin assured me that her 2007 study was built on a solid foundation of previous experiments employing both a hill and a helping/hindering paradigm. Numerous analyses, she insisted, have shown that infants will interpret even two-dimensional animations as real, and often attribute goals and intentions to basic shapes engaging in apparently self-propelled movement—with or without artificial eyes.

I also wondered how the infants were "encouraged" to choose. In the video, characters were shaken by the person holding them. Could that have affected the outcome, perhaps combined with verbal inflection? Was one character ever held closer to an infant than the other, or at least closer to the infant's dominant hand?

Her presenting colleagues, Hamlin answered, were always blind to the condition—i.e., ignorant of which character was helper or hinderer for that particular baby. So, if differences in proximity or emphasis existed, their effects would have been divided randomly across subjects. Also, she noted, parents were instructed to close their eyes during choice phases.

Scarf responded quite differently. He sees no reason to believe, for example, that six- and ten-month-olds would interpret Hamlin-esque displays as landscapes, or that they would be familiar with the concept of a hill. Nor could they distinguish between helping and hindering, he argued. And while infants may attribute intentions and goals to animate objects, he added, no convincing data suggests they might assign relevant feelings to them as well.

Five years passed before Scarf's team would offer a conflicting explanation—the "simple association hypothesis"—for the infants' remarkable behavior. While inspecting Hamlin's videos, Scarf distinguished "two conspicuous perceptual events" during the helper/hinderer trials: first, an "aversive collision" between the climber and either the helper or the hinderer, and second, a "positive bouncing" when the climber and helper reached the hill's summit.

Rather than rendering complex social evaluations, Scarf proposed, Hamlin's babies may have simply been reacting to a visual commotion. The hinderer was perceived negatively, he hypothesized, because it was associated only with an aversive collision. The helper, by contrast, was viewed more positively because it was linked with an optimistic bouncing in addition to a collision.

To test their suspicions, the New Zealanders devised two experiments. In the first, eight ten-month-olds would be presented with googly eyed characters on a Hamlin-esque stage. Scarf would eliminate the climber's bounce on help trials and then pair the helper with a neutral character. If infants choose based on social evaluation, he reasoned, they should select the helper. But if infants find the helper/climber collision aversive and react instead via simple association, they should pick the neutral character.

In the second experiment—this time involving forty-eight ten-month-olds—the team would manipulate whether the climber bounced during help trials (at the top), hinder trials (at the bottom), or both. They would then present the children with a choice between hinderers and helpers. Again, Scarf proposed, if infants choose based on social evaluation, they should select the helper universally. But if driven by simple association instead, they should select whatever character was present in the trials when bouncing occurred, and show no preference in the bounce-at-both-top-and-bottom condition.

The results were striking. In the first experiment, seven of eight children chose the neutral character over the colliding and non-bouncing helper. In the second experiment, twelve of sixteen picked the helper in the bounce-at-the-top condition, another twelve of sixteen opted for the hinderer in the bounce-at-the-bottom condition, and an equal number (eight of sixteen) chose the helper and hinderer in the bounce-at-both condition.

Thus, Scarf resolved, simple association can explain Hamlin's 2007 results without resorting to the comparatively complicated notion of an innate moral compass. In fact, he continued, his results were entirely *inconsistent* with Hamlin's core conclusions. Infants do not perceive collisions between hinderers and climbers as qualitatively different from those between helpers and climbers, and they do not prefer helpers regardless of bounce condition.

Invoking Darwin, Scarf claimed to add momentum to a movement in developmental psychology toward more parsimonious interpretations of infant behavior. There is much "grandeur in the view," he philosophized, that complex adult cognitive abilities can be discovered through a more sober comprehension of "these simple beginnings."

On August 9, 2012, Hamlin—now at the University of British Columbia—posted her team's unyielding response. Generally, they found Scarf's account "unpromising," and were "bemused" by the New Zealanders' attempt to recruit Darwin—who "wrote extensively about the powers (and the limits) of our inborn moral sense"—to their cause. Hamlin criticized Scarf's experimental design as well, and his failure to adequately address results she had obtained and published after 2007.

Can infants fathom, for instance, what artificial landscapes represent, or what "hills" look like? Can they grasp the symbolic significance of squares, triangles, and circles adorned with "googly eyes"?

By Hamlin's lights, Scarf's stimuli had differed from her own in ways that left the climber's goal—and thus the insinuation of being helped or hindered—unclear. First, the googly eyes attached to Scarf's climber were not fixed in an upward gaze. Second, Scarf's climber moved less organically, as if able to climb easily without the helper's assistance.

Hamlin also emphasized that she had replicated the 2007 results in studies involving no climbing, colliding, or bouncing whatsoever. In 2011, for instance, she found that infants prefer characters who return balls to others who drop them

(Continued on page 52)

[SKEPTICAL INQUIREE BENJAMIN RADFORD

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Lessons from a Denver Fly

Q: What's your take on the recent Denver UFO video? Any lessons for skeptics?

—R. Miller

A: An unusual video of mysterious dark objects moving very quickly and erratically over the skies of Denver, Colorado, caused a national stir in November 2012. An anonymous UFO buff showed KDVR Fox News reporter Heidi Hemmat home videos he had filmed from an open field during the past summer of "strange objects . . . nobody can explain."

Robert Sheaffer is covering the subject in this issue, and interested readers should see his column for a detailed discussion. This case holds some interesting real-world lessons about skepticism, credulity, journalism, and UFO believers. I got involved in this case when I was asked by the Discovery Channel to research the case and write about it in a column for Discovery News (Radford 2012). The piece elicited interesting comments from readers.

Several complained that other skeptics and I had claimed to have solved the mystery without having done any investigation. In fact I never claimed to have investigated (or definitively solved) the Denver UFO video. Having had investigation experience with insects being mistaken for ghosts and UFOs, I merely provided some expert skeptical analysis and context to the claims, pointing out the logical reasons why what was seen in the film was likely an insect instead of, for example, an extraterrestrial spacecraft.

Ask the Experts

One person asked me, "Any chance that a real scientist can get some real high speed footage of that thing? The cameras and lenses certainly are available, and it might actually be able to capture a clear image." This sentiment was echoed by others, and seems like common sense. The problem is that, as a practical matter, few if any "real scientists" are eager to spend their time on this, especially those outside of Denver. Most probably have better things to do (such as holiday shopping, work, etc.) than to gather cameras, tripods, and other gear, locate the field in Denver, and videotape what are almost certainly insects. Preparing and executing this experiment could take several days of work for little benefit. It's not that the scientific community is ignoring or dismissing it, as is often claimed.

Believers in paranormal phenomena often say things like, "Scientists should come investigate" a given UFO or Bigfoot or ghost sighting. *Which* working scientists, exactly, should take time off their jobs in cancer research, developing new energy technologies, or whatever important jobs they're doing, to spend an unpaid afternoon in a cold, empty field waiting for an insect to fly by? Of course if a scientist wants to conduct such an experiment or investigation, their participation would be welcome and useful. Suggesting that scientists should look into these sorts of mysteries is a great idea in theory, but in the real world most working scientists cannot simply take a day or more off work to investigate a UFO video—especially in cases like this where the explanation is pretty clear to everyone except UFO believers and TV reporters.

This is where skeptical investigation comes in—almost always by non-scientists such as Joe Nickell, Robert Sheaffer, Jim Underdown, me, and others. Understanding critical thinking and how science works is far less important than having an advanced degree in science or being a working scientist.

Recreating the Video

This raises a second investigative question: What is the value in a scientist or skeptical investigator going to the site with cameras? The videos had been shot months earlier, and by the time the story aired many of the bugs and insects were no longer active in Denver. There's little point in trying to replicate a video unless you can do it under identical (or

very similar) conditions. The context and environment at play on a summer afternoon is not the same as it would be on a winter night. In any event, dozens of locals—as well as several Denver-area skeptics, including those from the Rocky Mountain Paranormal Society—visited the field and noted the presence of bugs (and lack of UFOs) in the area.

There's no harm done in trying to recreate the original videos, but it's unlikely that the result—no matter how closely replicated—will satisfy the believers. Even if an investigator provided an iron-clad case with multiple cameras, many UFO buffs would simply find reasons to claim that the videos are different than the originals—perhaps the "UFOs" moved slightly faster or slightly slower, or were a different color, etc. Such is the desire to believe. In fact, there are already several existing videos showing what flying insects look like; you can find links and video at Robert Sheaffer's *Bad UFOs* blog.

Another problem with this suggestion is that it has the burden of proof exactly backward: It is not up to skeptics or scientists to prove that the UFO is likely an insect; it's up to those who claim that the image is of an unknown entity to prove that it's not an insect. There are times when an investigator will voluntarily assume the burden of proof (I did it in my examination of the "best case for psychic detectives"; see "The Psychic and the Serial Killer," SI, March/April 2010). But it's a slippery slope, and it's important for skeptics to make clear to both the public and UFO claimants where exactly the burden of proof lies. The default explanation is a naturalistic one—in this case likely a bug—not a supernatural or extraordinary one; it's not a spaceship until proven otherwise by camera-savvy scientists and skeptics.

Alternative Explanations

This case also illustrates an important issue in skeptical investigation: In order to get the right answers you have to ask the right questions. Heidi Hemmat, the reporter, made several investigative errors, including not considering alternative explanations. How you understand and approach a mystery dictates how you will investigate it. The reporter accepted the UFO buff's interpretation of the flying objects as being large and high above the city, so that's how the mystery was framed, and that guided the questions asked. On the other hand, if Hemmat had simply taken the footage at face value (there are dark, out-of-focus objects moving quickly at an unknown distance from the camera) that might have guided her to other explanations and experts.

Anomalous experiences and photographs—indeed all evidence—does not arrive in the investigator's hands pure. Instead, the evidence arrives freighted with opinions and interpretations from eyewitnesses, researchers, and others. These interpretations of the evidence may turn out to be completely correct, completely wrong, or somewhere in between. Because those opinions are often formed by little more than subjective opinion, desire to believe, credulity, or any number of other factors, it is important for an investigator to start fresh, stripping away the second-hand interpretations and assumptions, and begin with a blank slate. The evidence should be taken at face value to start, and each assumption should be checked for validity before being accepted. In essence, much of investigation is merely deconstructing a theory to see if all the pieces of information really fit or make sense when assembled in a different way.

Several readers complained that I and other skeptics had presented the fly explanation as definitive; one wrote, "It is doubtful that Radford's insect explanation is as certain as he maintains." In fact, in presenting the skeptical viewpoint, I was careful to not go beyond the evidence, and qualified the explanation as *likely*—not certain. This was clear from the headline ("Denver UFO Likely Has Earthly Explanation") as well as the text ("The most likely explanation? A bug or insect, probably a fly or bee.").

Ironically, the only certainty expressed by anyone involved in the story was by the aviation expert, Steve Cowell, that KDVR put on the air, who categorically stated what the objects absolutely could *not* be: "That is not an airplane, that is not a helicopter, those are not birds," he said. In an on-air voice-over, Hemmat also stated that Cowell was certain the objects were not bugs.

Thus, contrary to the popular view of skeptical debunkers closed-mindedly dismissing the alien spacecraft theory out of hand as ridiculous and impossible, skeptics merely employed the principle of Occam's razor to the circumstances of the video and offered a plausible alternative explanation. It was instead the UFO promoters and their experts who dismissed the most likely theory out of hand, saying that bugs absolutely could not explain the video images.

So who's being more open-minded: the skeptics who aren't ruling anything out as impossible but are merely presenting a likely alternative explanation that fits the facts, or the UFO believers who immediately conclude that bugs could not possibly be mistaken for the images and therefore must be something unknown or mysterious?[1] (See also Petrovic's Forum, p. 53.)

Some criticized Hemmat and KD VR for incompetence and ratings-grabbing, and while that may be partly true, it's easy for skeptics to forget that the general public (which, apparently, includes TV reporters) does not have a good grasp of basic investigation techniques. This is why skeptical investigation is so important. ■

Note

1. Some UFO believers rather disingenuously claimed that nobody mentioned in the KDVR report had claimed or implied that the UFOs were alien spacecraft, but merely "unidentified flying objects." This is not only factually wrong (if the suggestion was not that the anomalies were aircraft or spacecraft, why were they said to be "taking off and landing" in a specific part of town?) but also nonsensical: if all that's being claimed is that they are unidentified, then why the backlash against skeptics offering a logical explanation for the UFO?

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Treatise on INVISI

Allegedly invisible entities—popular belief notwithstanding—are indistinguishable from imaginary beings.

JOE NICKELL and JAMES McGAHA

Popular belief aside, the best scientific evidence indicates that entities that are reputedly capable of invisibility[1]—ghosts and other spirits, for example, as well as some extraterrestrials, angels, fairies, and many others—*are indistinguishable from imaginary beings*.

Natural Invisibility?

Invisible, in this context, does not mean *transparent*[2] (like a jellyfish), nor *camouflaged*[3] (such as a chameleon), nor *obscured* (as with a magician's rabbit), nor *microscopic* (like a bacterium) but instead truly invisible: that is, when the entity is in the invisible mode it is incapable of being seen by human vision in the visual spectrum. It neither reflects, refracts, absorbs, scatters, nor radiates light.[4]

No physical entity—that is, a being composed of ordinary matter[5]—can exist in an invisible state, short of being dematerialized, in which case it would not exist as matter. The very substance of such a matter-centric being—a person or other living (or even nonliving) thing of the natural world—necessarily renders it visible and at the same time incapable of invisibility. But if this is true, then what of an invisible girl exhibited at Paris in the eighteenth century?

Supposedly a prodigy born in one of the provinces, she was kept, presumably for her own safety, in a small casket. This had glass panels on the top, front, and back so spectators could see through the box, which was suspended from the ceiling by four chains. Thus there was nowhere for anyone to hide. Yet a horn attached to one end of the casket allowed people to address questions to the invisible girl and to hear her voice in reply! Theories that it was a ventriloquial trick were soon discredited. As to the theory that a tiny dwarf

BLE BEINGS

hid behind the trumpet, that notion was likewise rejected because—had such a miniature mortal existed—it would have been more sensible to exhibit it than to fake an "invisible girl."

As it happened, there really was no invisible girl but rather a real one hidden in the adjacent room. She addressed spectators through a speaking tube—with its end that emerged from the wall being concealed by the large mouth of the trumpet. A picture on the wall had a secret peephole through which the hidden girl could observe objects held up to the casket and so describe them in detail (Gibson 1967, 44–45).

Advanced Technology?

Of course, one may assert that some technological advance may make invisibility possible, but this is merely a science-fiction notion. It was advanced as early as 1897 in a novella by H.G. Wells. Titled *The Invisible Man*, it tells of a scientist named Griffin whose optics research enables him to alter a body's refractive index to that of air; thus it neither absorbs nor reflects light and so becomes invisible. (Griffin succeeds in making himself invisible but—unable to reverse the effect—embarks on a rampage that culminates in his own killing by a mob. As he dies, his body slowly returns to visibility.) Another science fiction story is the humorous *Abbott and Costello Meet the Invisible Man* (1951). (Mistakenly accused of murder, a man injects himself with a se-

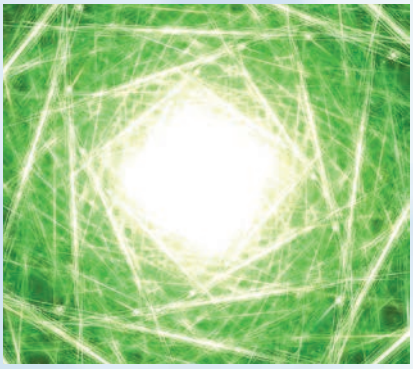
cret formula that renders him invisible so he can elude authorities and trap the real killer—with the help of a couple of wacky private eyes.)

Fiction notwithstanding, in 1943—according to a later book, *The Philadelphia Experiment* (Moore and Berlitz 1979)—invisibility supposedly became a reality. Allegedly, the United States Navy conducted an experiment with "electronic force fields" at the Philadelphia Navy Yard that succeeded in rendering a battleship and its entire crew invisible! Reportedly, however, the experiment had such traumatic effects on the personnel that the research was abandoned, the project classified above top secret, and the entire incident publicly denied—another great government conspiracy.

In fact, the "experiment" was nothing but an outrageous hoax, perpetrated on credulous researchers by one Carl M. Allen, who also called himself Carlos Allende. Born in 1925, Allende was considered brilliant but lazy and given to practical jokes. He later (1969) admitted the invisibility claims were "false . . . the crazyest [*sic*] pack of lies I ever wrote." Still later he retracted the confession, and the subsequent book and a 1984 movie helped keep the hoax alive (Stein 1993, 176–77).

But can we really be certain that no technology in this or another universe can ever be devised to cause invisibility? Well, we certainly can *imagine* such. "However," according to *Chambers Dictionary of the Unexplained*, "although there are many theoretical suggestions as to how invisibility might be achieved, for the time being 'real' invisibility or perfect transparency . . . remains firmly within the realm of science fiction" (McGovern 2007, 347). (To all those who would, from their armchairs, opine, say, about theoretical physics, we would only ask them to wait until they have *accomplished* invisibility and then get back to us.)

Extra-Dimensional Realms?



But suppose invisibility already exists. One may hypothesize means by which an entity supposedly appears and disappears, such as a "parallel universe" (Sachs 1980, 84) or "another dimension or space-time continuum" (Sachs 1980, 239). However, these concepts also are unproven, and cases supposedly proving them typically do not withstand scrutiny.

Consider, for instance, the case of Oliver Larch, whose disappearance on Christmas Eve 1889 is one for the annals of the incredible. Leaving the Larch family farmhouse on the outskirts of South Bend, Indiana, to fetch water, the eleven-year-old boy was soon heard crying out in alarm. His parents and neighbors, who had gathered to sing to Mrs. Larch's organ music, rushed outside. By lantern light the group followed Oliver's footsteps in the snow until, about halfway to the well, they abruptly ended! "Because it defied logical explanation," writes Frank Edwards (1962, 103), "the disappearance of this boy was quietly filed away and forgotten."

Unfortunately, this story succumbed to investigation. Like another disappearance narrative—that of Tennessee farmer David Lang, who in 1880 vanished in full view of witnesses but whose voice could be heard faintly at the site over subsequent years—the Larch story turns out to have been plagiarized from a trilogy of Ambrose Bierce short stories. The Larch tale bears obvious similarities to Bierce's "Charles Ashmore's Trail," just as the Lang yarn does to his "The Difficulty of Crossing a Field" (Nickell 1980; 1988, 61–73). At the end of his "Mysterious Disappearances" trilogy is a postscript in which he relates the theories of an obvious crackpot who postulates, says Bierce, that "in the visible world there are void places" likened to the "cells in a Swiss cheese," that somehow explain disappearances (Bierce 1893).

Alien Domains

At some point, such thinking crosses over into the paranormal. Take extraterrestrials, for example. Alien beings are sometimes said to have the power of invisibility—not unlike fairies and other magical beings (to be discussed later).

But can we really be certain that no technology in this or another universe can ever be devised to cause invisibility? Well, we certainly can *imagine* such.

According to many witnesses, an extraterrestrial may suddenly come into view, or vanish in an instant, while others report similar behavior of UFOs. Some think the disappearing craft simply "returns to its original dimension" (Sachs 1980, 84), while there is also the implication that, before and after it was perceived, it was invisible.

A major proponent of invisible UFOs was Trevor James Constable—a man with strange ideas indeed. Constable stated in his book *Sky Creatures* (1978, 7–8) that "the main direction in which UFO phenomena lead human inquiry" is "into the invisible." Constable postulated that UFOs were "invisible" beings in an "invisible [infrared] realm." They "occasionally emerge into the visible portion of the spectrum," being sustained and propelled by "orgone energy" (1978, 12, 18).

Imagined by a crank named Wilhelm Reich (1897–1957), orgone energy is said to be "life energy." It supposedly causes stars to twinkle, produces lightning and other static electric phenomena, and animates dowsing rods—among many other functions. In the human body it purportedly recharges red blood cells through breathing and provides sexual energy (Gardner 1957, 250–262). Constable notwithstanding, Reich's orgone proved to be imaginary and, after Reich ignored an injunction against selling his allegedly curative but worthless Orgone Accumulator boxes, he was tried, fined, and sentenced to two years in prison, where he died (Randi 1995, 222).

Constable proposed that there were two main types of UFOs: 1) actual living "critters" that inhabit Etheria, an invisible world of the atmosphere (just as fish live in the sea), and 2) inanimate craft piloted by Etherean intelligences—both propelled of course by orgone energy (Constable 1978; Sachs 1980, 71). He claimed to have captured both types on infrared film, but his work seems doubtful in the extreme, has never been conducted or reported in any responsible scientific manner, and has not been replicated by mainstream science. Not surprisingly, he rants against "official science" for "evading its responsibilities" to investigate UFOs rather than engage in "organized obscurantism and ridicule" (Constable 1978, 15–17). However, to the extent scientists have engaged in ridicule of UFOs, cranks like Trevor James Constable have mostly themselves—and their runaway imaginations—to blame.

Spirit Realm

Some claim that a person does not really die at death but instead becomes a ghost or spirit, supposedly formed of energy, and lives on, invisibly, in that state. As with aliens, some speak of an "invisible realm" for spirits (Guiley 2000, 356). Proof, however, is lacking. Moreover, we know from the science of neurology that when the brain dies, brain function ceases; any energy given off by the body necessarily dissipates. Nevertheless, "ghost hunters" purport to detect such energy using gadgetry—electromagnetic-field meters, thermal imaging cameras, and so on—but that approach is just so much pseudoscience (Nickell 2006).

Some claim the invisible entity may be viewed *psychically*. That is to say, a spirit of the dead, for instance, may be seen by a "medium"; or an angel, deity, or the like may be perceived by a "visionary." Invariably, however, such seers are revealed to have fantasy-prone personalities (Wilson and Barber 1983; Nickell 1995, 40–42, 157, 162, 167, 176, 211–14), or they appear to be hallucinating (Nickell 2007, 80, 245–55, 260–62) or both—assuming they are not outright charlatans. There is no convincing scientific evidence that anyone has psychic powers of any kind—hence James Randi's longstanding offer of a substantial reward to anyone who can prove he or she has such abilities under scientifically controlled conditions (Randi 1991, 151–53).

Consider Mary Ann Winkowski, for example. The real-life model for the central character in the fantasy TV series *Ghost Whisperer*, Winkowski claims to see and talk to earthbound spirits (not those who have supposedly "crossed over" to the Other Side). Since she was a child of four, she says, she has been able to "see" the dead at funerals even though they are invisible to others. She maintains that the spirits "smoke, comb their hair, change their clothes—all those things we always do too. Only I've never been able to figure out where they get the stuff from" (Winkowski 2000, 150).

As a child, Winkowski had what seem to have been imaginary playmates, although she insists they were not imaginary. As an adult she claims to receive special messages from paranormal entities and frequently encounters apparitions—as well as exhibiting numerous other traits consistent with being a classic fantasizer. There is a distinct lack of objective evidence for her claims that spirit entities exist (for instance, an anomaly in a client's photo, supposedly depicting spirit energy, was actually caused by the flash rebounding from the camera's wrist strap).

The evidence strongly suggests instead that Winkowski is simply participating in encounters of her own imagination (Nickell 2010). Therefore, the source of the "stuff" that puzzles her—the *inanimate* objects that are seen in the possession of apparitions that supposedly represent *life* energy—is clear. As Tyrrell (1973) noted, apparitions of visibly rendered invisible people invariably wear clothes and are accompanied by objects—just as they are in dreams—because the items are necessary to the apparitional drama. In other words, the inanimate objects, like the entities themselves, are imaginary.

Visionary Experiences?

As to the perceptions of reputed visionaries, similar problems present themselves. Take Joseph Smith, for instance,

the Mormon founder who claimed to receive instructions from an entity, an angel of God named Moroni. He appeared at Smith's bedside and told him how to find a holy account, written on gold plates and now known as the Book of Mormon. Regarded by many as a veritable confidence man, and certainly a person with an extraordinary propensity to fantasize (Wilson and Barber 1983), Smith appears to have experienced common "waking dreams" (hypnagogic hallucinations) that occur in the twilight between sleeping and waking (Nickell 2004, 296–303).

Or consider the famed Catholic visionary, Lucia Santos, who at age ten was one of three shepherd children who encountered the Virgin Mary at Fatima, Portugal, in 1910. She and her seven-year-old cousin Jacinta Marto saw the dazzling apparition, radiant in white light, and Lucia convinced Jacinta's brother Francisco to eventually "see" her too. Only Lucia ever talked to the Virgin, who supposedly appeared on the same day during each of several months, yet remained invisible to the onlookers. As it happened, Lucia was a precocious, imaginative, and charismatic child who had earlier apparitional experiences. Clearly a fantasizer who manipulated the other children (Nickell 2009), she was, her mother said, "nothing but a fake who is leading half the world astray" (qtd. in Zimdars–Swartz 1991, 86).

Magick?

During the witch craze of the fifteenth to eighteenth centuries, it was sometimes reported that devils called incubuses were either "visible or invisible." Supposedly they would copulate with "witches," whereupon, although the female was said to be in the throes of ecstasy, the incubus was not visible, yet at other times "a blacke vapor of the length and bignesse of a man" was allegedly seen to depart from her. Reginald Scot repeats such tales in his *Discoverie of Witchcraft* ([1584] 1972, 43–44), albeit with profound skepticism.

According to other legends, witches are themselves said to have the power of invisibility—as well as of flying, shapeshifting, astral projection, clairvoyance, and other supernatural powers (Guiley 1991, 647–50). Then again, according to gypsy lore, a man could become invisible to witches by doing as follows: "He must rise before the sun, turn all his clothes inside out and then put them on. Then he must cut a green turf and place it on his head. Thus he becomes invisible, for the witches believe he is under the earth, being themselves apparently bewitched by this" (Leland 1995, 148).

Occasionally, invisibility magic even purports to make someone invisible *from himself*. Usually, however, the intent is to prevent others from seeing him. One such fourteenth-century charm involves reciting Genesis 19:11: "And they smote the men that were at the door of the house with blindness. . . ." This is predicated on the belief that holy writ will cast a spell of blindness over others—though that is not really the same, even if it did work, as actually becoming invisible (Cavendish 1970, 11:1453).

Yet a medieval grimoire offered a talisman promising to "make you invisible, even to spirits." Reputedly, "You will be able to traverse the bosom of the seas, the bowels of the earth. Likewise you will be able to sweep through the air, nor will any human act be hidden from you." One needed to "say only: Benatir, Caracrau, Dedos, Etinarmi" (Wedeck 1961, 47).

Among the magical items reputed to make their bearer invisible are various cloaks, amulets, rings, and potions. These may be found in folktales and legends (McGovern 2007, 347). According to one folklore authority (Leach 1984, 526–27), "Some beings, gods and ghosts and angels, need no such paraphernalia to appear and disappear, but dwarfs and men must have some talisman to do the trick."

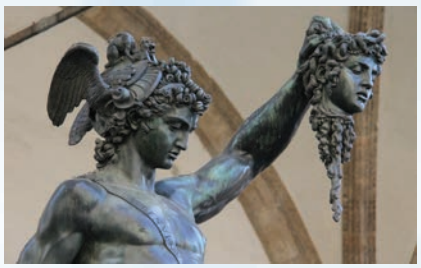
Behind all such claims and practices is the belief in magic—the attempt to use spells, offerings, invocations, or the like to supplant natural processes. Whereas the latter constitute the domain of science, magical thinking—the opposite of science (Randi 1995, 193)—is rooted in superstition.

Interestingly, throughout folklore certain entities that supposedly have the power of shapeshifting (the ability to alter their shape) also typically have the power of invisibility. Such reputed shapeshifters include ghosts, spiritual entities, monsters, witches, and others (Leach 1984, 1004–1005). A good example is the vampire, which may trans-

Interestingly, throughout folklore certain entities that supposedly have the power of shapeshifting also typically have the power of invisibility.

form itself into a bat, feline, hound, insect, etc., as well as have the power of invisibility—in addition to being unseen in a mirror (Bunson 1993, 42, 70, 100, 176–77). Another example is the fairy (see Thompson [1955] 1989, 41–44). Shapeshifting's link with invisibility emphasizes the latter's magical/fantasy nature.

Deistic Power?



Various demigods and deities throughout history have been attributed power over visibility. In Greek mythology, Perseus, for instance, son of Zeus and Danaë, wore a helmet that conferred invisibility. This helped him become victorious over the snake-haired monster Medusa whom he decapitated (McGovern 2007, 347).

Some gods, like those of early Hindu literature, were not only invisible but "could assume any visible form at will to favoured worshippers" (Hastings 1914, 7:405). This was also true of the god of the Bible. It was in order to be seen that he appeared to Moses in the form of a burning bush (Exodus 3:2–4). In New Testament passages are references to "the invisible God" (Colossians 1:15) and to "the invisible things of him" (Romans 1:20).

According to the *Encyclopedia of Religion and Ethics* (Hastings 1914, 7:404):

> The attribute of invisibility is one which is shared by gods, spirits, demons, the dead and the region of the dead, or the world of the gods, while the power of becoming invisible belongs to those beings as well as to certain mortals. Where invisibility was ascribed to gods or spirits, one simple reason probably was that in the case of most of them, apart from animal-gods or worshipful parts of nature, they were in fact unseen.

And that brings us back to our original point, that allegedly invisible entities—popular belief notwithstanding—*are indistinguishable from imaginary beings*. That is, an *invisible* entity necessarily means an *immaterial* one, one that therefore can exist only as a product of the imagination. ■

Notes

1. Invisible: Not seen in the visible electromagnetic spectrum (VES) (wavelength from 400nm to 690nm; frequency from 750THz to 435THz). Light is electromagnetic radiation (EMR), i.e., energy emission (oscillating transverse wave) produced when charged particles (electrons) are accelerated. The quantum of EMR is the photon.

2. Transparency: The condition of allowing some light (EMR) to pass through.

3. Camouflage: Concealment against background environment by resembling the background and disrupting patterns and edges. Certain technological claims of invisibility—using metamaterials, nanotubes, crystal prisms, and mirrors to create a two-dimensional illusion—are nothing more than static active/adaptive camouflage.

4. Again, *light* is EMR (see n. 1).

5. Ordinary matter: made of atoms and molecules, which are made of protons, neutrons, and electrons, composed of fermions—namely quarks and leptons.

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The Elberfeld Horses

They were the most important of Clever Hans's heirs. Their story is an archetypal example of the intertwinement that often exists between pseudoscience and the paranormal.

STEFANO VEZZANI

The story of Clever Hans, the reasoning horse, is very well known. What is less known is that several other clever animals followed Hans soon after. The most prominent among them were the "Elberfeld horses."

Clever Hans is still remembered because he was the object of a study that represented one of the highest achievements in experimental psychology up to that time and which Oskar Pfungst (1907) detailed in a classic book. Pfungst's discovery of the "Clever Hans effect" has changed the way in which many experiments are conducted in fields where there is an interaction between the experimenter and an animal or human subject.

Figure 1. The horse Zarif, one of the Elberfeld horses, attends a lesson by Krall (source Krall 1912).

On the other hand, the Elberfeld horses did not enhance our knowledge of science or psychology, and no classic book was dedicated to them. As a consequence, they have almost been forgotten. They deserve to be remembered, however, because the events in which they were involved are an archetypal instance of pseudoscience. As several authors pointed out at the time, the story of these animals is also an exemplary illustration of the intertwinement that often exists between pseudoscience and the paranormal.

Clever Hans, the Progenitor

In 1900, Wilhelm von Osten of Berlin set out to educate his horse, Hans, to prove his revolutionary theory: If horses were educated like children, the fundamental intellectual resemblance between them and people would surface. He educated Hans applying the same pedagogical principles then used in elementary schools and taught him by means of a blackboard and verbal explanations.

Allegedly, Hans learned to do arithmetic and understand spoken and written German. For instance, if he was asked "What is three times four?," he tapped the ground twelve times with his hoof. Moreover, Hans was able to "talk," as he had learned to represent each letter by tapping a certain number of times.

Von Osten started exhibiting Hans in public in 1904, and very soon the

horse, known by the nickname of "Kluge [Clever] Hans," became famous throughout the world. A heated controversy opened up between skeptics and believers, and it soon became clear that it could only be settled by conducting experiments on Hans. A multidisciplinary scientific commission delegated the psychologist Oskar Pfungst to undertake the experiments.

Most of Pfungst's experiments consisted of two conditions: a condition "with knowledge" and another "without knowledge." In the first case, the examiner knew the answer to the question he asked Hans; in the second, he did not. Pfungst proved that Hans answered correctly only in the "with knowledge" trials. It was as if Han's did not work the answer out by himself but rather read it in the examiner's mind. In fact, whether or not Hans could hear the question seemed irrelevant.

Moreover, Hans managed to answer correctly only when he could see the examiner. This suggested that he was exploiting some visual cues coming from the examiner. Indeed, Pfungst ascertained that the examiner *unconsciously* stooped very slightly immediately after having asked a question. When Hans saw this movement, he started tapping. When the horse reached the correct number of strokes, the examiner straightened up. Hans perceived this movement and stopped tapping.

On December 9, 1904, the scientific commission proclaimed that Hans could not reason and that rather than being educated he had been trained, albeit unintentionally. Public discussion about Hans then came to an end.

According to most accounts, the story ended here. As a matter of fact, however, it continued when in 1905 von Osten made contact with one of the very few people who had not accepted Pfungst's explanation: Karl Krall, a wealthy jeweler from Elberfeld (now Wuppertal).

Sensation at Elberfeld

Krall inherited Clever Hans upon the death of his owner in 1909. However, Hans had become almost unmanageable and Krall resolved to "educate" two other stallions, Muhamed and Zarif. He began delivering daily lessons to them applying von Osten's methods.

Krall (1912) explains that the work was worth his while as the horses, after they had learned to communicate by tapping, like Hans, manifested capabilities superior to those of any child. After thirteen days, Muhamed could already add and subtract, and after twenty he could multiply and divide. Soon, the horses also learned to work out roots in a few seconds, something beyond Hans's capability, and to solve complex equations such as $\sqrt{4536} - \sqrt{1849} * \sqrt{196} - \sqrt{144}$. They also learned to understand spoken and written German and French, and to "speak" German. As with Hans, each letter was represented by a number.[1]

In time, two other horses joined Muhamed and Zarif: Hänschen and Berto. These equines were to go down in history as the Elberfeld horses.

The education of the horses continued for a couple of years substantially as a private matter. However, little by little, the news spread and many people asked to see the horses at work. There were scientists among these people and a few of them were so impressed that they persuaded Krall to write a book (Mackenzie 1912). The book appeared in 1912 with the title *Denkende Tiere* (*Thinking Animals*) and was more than 500 pages long.

Krall was a strong science enthusiast. Nevertheless, his book was unorthodox

The scientific commission proclaimed that Hans could not reason and that rather than being educated he had been trained, albeit unintentionally.

Clever Hans performs for a crowd.

from a scientific perspective, a point several critics did not fail to notice. On the other hand, it also received enthusiastic comments. Wilhelm Ostwald, the Nobel laureate for Chemistry in 1909, expected that it would mark "as clearly the beginning of a new chapter in the doctrine of man's place in nature as Darwin's chief work did in its day" (*Nature* 1914–1915). The eminent psychologist Édouard Claparède (1912) wrote that the publication of Krall's book "is certainly the most sensational event that has ever happened in animal psychology and possibly in psychology at large."

On the whole, Krall's book had a wide-reaching effect, and the Elberfeld horses soon became even more famous than Hans had been in his time.

A Controversy Ensues

Krall and his followers founded the *Gesellschaft für Tierpsychologie* (Society of Animal Psychology) in 1912 and the journal *Tierseele* (*Animal Mind*) in 1913, two entities entirely dedicated to reasoning animals. Robert Yerkes, the well-known American psychologist and primatologist, was a member of the *Gesellschaft*.

Like von Osten, Krall and his advocates believed that the horses "have received a real education, and have learned to think like us" (Mackenzie 1912). As with Hans, however, explanations based on telepathy were also put forward: perhaps something was being transferred directly from the brains of those present to the brains of the horses (Claparède 1913).

Many personalities journeyed to Elberfeld. After the influential neurologist Ludwig Edinger had seen the horses, he began supporting Krall's theories passionately. A number of zoologists, too, embraced the cause of the horses, for example, H. Kraemer, P. Sarasin, H. E. Ziegler, and K. Gruber, a scholar of the occult (Gruber 1930). The prestigious biologist Ernst Haeckel wrote to Krall: "Your careful, critical experiments convincingly prove the existence of reason in animals, something I have never doubted" (Claparède 1912).

However, there were also many scientists and intellectuals who thought that the attention the Elberfeld horses were getting in the intellectual and scientific community was unwarranted. Most important, at the IX International Congress of Zoology held in Munich in 1913, twenty-four scientists signed a statement of *protest* regarding the diffusion of Krall's theory (Claparède 1913). Skeptics believed that the Elberfeld horses had simply been trained, like Hans, and that their performances could be explained by Pfungst's theory. It is significant that there were experts in horse training among the skeptics (e.g., von Máday 1914) but not among the believers.

I am particularly familiar with the Italian writings, which are very representative of the European literature in general. The Genoese biologist William Mackenzie was the most active Italian advocate of Krall's theory and was often cited in the international debate. Some of his many articles on the subject appeared in journals dedicated to the paranormal. In the 1950s, Mackenzie was chairman of the Italian Society of Metapsychics.

Roberto Assagioli also became an enthusiastic admirer of Krall after having journeyed to Elberfeld with Mackenzie in September 1912. He was a theosophist and became famous later on as the founder of psychosynthesis, a school of psychotherapy. One concept of psychosynthesis is the transpersonal unconscious, from where paranormal powers emanate.

The psychiatrist Giulio Cesare Ferrari was cautiously interested in the Elberfeld horses, mainly because he was an educator. He wrote that they proved "the boundless possibilities of education" and was sure that both intentional and unintentional signs had to be absolutely ruled out. However, he ascribed the achievements of the horses to their memory rather than to their intelligence (Ferrari 1914).

The physician and psychologist Father Agostino Gemelli was very critical, although he conceded that the problem did not admit of a simple solution (Gemelli 1913). Above all, he lamented the absence of a serious inquiry aimed at verifying whether Pfungst's explanation of Hans's feats also applied to the Elberfeld horses.

Luigi Siciliano (1914) and the psychical researcher Cesar de Vesme (1912) believed that the performances of the horses had a mediumistic explanation. Stefano Stefani (1913) claimed that the explanation was to be found in telepathy.

Pfungst's Theory Refuted?

Skeptics insisted that the only way to establish whether or not Pfungst's theory applied to the Elberfeld horses was to perform experiments using a "without knowledge" condition. The problem was, however, that Krall prevented skeptics from experimenting (e.g. Gemelli 1913). Pfungst (1912) himself lamented that Krall had rejected all three of his requests to study the horses.

According to the believers, Pfungst's theory of unconscious signs hardly deserved to be mentioned. It was widely refuted by facts, as so many observers had testified after they had seen the horses with their own eyes. Claparède (1912), for instance, made the following written statement for Krall: "The horses answered correctly under circumstances that absolutely rule out the hypothesis of intentional or unintentional signs. It seems certain to me that the aforesaid horses really count the number of taps. . . ."[2] In short, "it can now be affirmed that *the reality and authenticity of* Krall's *results are certainly and definitely established*" (emphasis in original, Assagioli 1912). In general, however, the evidence against Pfungst's theory consisted of anecdotes and testimonies, whereas strict experiments were wanting.

Nevertheless, some experiments à la Pfungst were undertaken by believers. Krall himself made a few, but he admitted in his book that they had substantially failed. Several other experiments of this kind were performed by Krall's advocates. We are told that they succeeded, but usu-

ally in conditions unsuited to a serious, controlled experiment. Actually, the Nobel laureate for Literature in 1911, Maurice Maeterlinck (1914), performed an experiment that could be considered quite satisfactory, if one accepts that his account is reliable. Alone with the horses, Maeterlinck randomly pulled three cards out of a deck without looking at them and put them in front of each animal in turn. The horses "communicated correctly the sum of the cards by tapping." (More on this presently.) Maeterlinck (1914) dedicated to the Elberfeld horses a long chapter of a book that was wholly consecrated to the occult.

Claparède managed to study the horses in March 1913 without Krall being present. Unfortunately, no conclusion could be reached, as the horses answered almost all the questions incorrectly—independently of the knowledge that the experimenter had of the answers. Krall assures us that another man made experiments a few days after Claparède and that he obtained positive results after he had made friends with the horses. Krall maintained that the results obviously depended on whether the visitors "are or are not liked by the horses" (Claparède 1913).

The possibility that any signals given may have been intentional was usually ruled out in very resolute terms. Nobody, not even the skeptics, doubted the absolute good faith of Krall.

A Magician Enters the Stage

The possibility that any signals given may have been intentional was usually ruled out in very resolute terms. Nobody, not even the skeptics, doubted the absolute good faith of Krall (e.g., Gemelli 1913). As for the grooms, "they really are two worthy and simple boys. They have a groom's mentality and are certainly no mathematics professors" (Mackenzie 1912). Most important, the horses worked well even when Krall and the grooms were not present, and this seemed conclusive evidence.

However, only an expert in deception can reliably ascertain whether a trick exists or not. Indeed, the likely truth was discovered only when an unspecified "psychological party" commissioned an investigation to be made by a professional conjurer, the Danish F. Faustinus (the stage name of Faustinus Edelberg), who was given the opportunity to study the horses closely in 1913. Two years later, Faustinus disclosed his findings in an article signed by Müller (1915)—see also Sebeok (1982) for a thorough account in English.

We learn from Schumann (1916) that "Mr. Faustinus Edelberg has already helped Prof. A. Lehmann of Copenhagen in the debunking of so-called spiritistic mediums. He is believed to be unusually skillful in 'mind reading' and it seems that, to this aim, he capitalizes on minimal unintentional movements."

Krall (1916a) wrote later that Faustinus had tricked him into believing that he was "an independent researcher" only interested in truth. Hence, Krall had let him perform some experiments with his horses, "as I have always done without any exception when I did not doubt the scientific integrity of the researchers."

Faustinus found convincing evidence that Albert, the only groom at that time, had swindled Krall. The conjurer started becoming suspicious when Albert immediately spotted a mistake that Faustinus had deliberately inserted in a problem that consisted of working out a fourth root.

Next, Faustinus realized that Muhamed worked only if he could perceive Albert. Even when Faustinus had the impression that he was alone with Muhamed, Albert was actually able to communicate with the horse from outside the stable, even from a considerable distance. When Faustinus prevented Muhamed from seeing Albert, the horse stopped answering correctly. This could explain the accounts, including Maeterlinck's, regarding the horses answering correctly even when their questioner did not know the answers and was seemingly alone with them.

Therefore, it seemed that Albert provided Muhamed with signals, but which signals? Faustinus discovered that there was just one very simple and "almost imperceptible" signal. When asked a problem, Muhamed started tapping but stopped when Albert shook his head slightly but discernibly. In sum, there was "a signaling in Pfungst's sense, the only difference being that here it is intentional" (Müller 1915). After he had discovered the trick, Faustinus was able to make Muhamed give right or wrong answers as he wished.

But Albert was just a groom, so how could he perform very complex computations so fast? Faustinus pointed out that a fully reliable system existed for working out three kinds of roots (square, cube, fifth) very easily.

Hänschen and Berto also failed when they could not perceive Albert's presence and so were almost surely controlled by him as well. Yet how, Faustinus was unable to discover. Certainly Albert did not use the same technique with them that he used with Muhamed. As for Zarif, Faustinus could not undertake any experiment on him. As a matter of fact, "Zarif could only be used as a saddle horse already by the summer of 1913," as his performances had severely deteriorated (Krall 1916b).

Faustinus could not complete his investigation because Krall forbade further inquiries when he was informed of the conjurer's findings. Although incomplete, Faustinus's account appears trustworthy, especially considering that Karl Wigge (1912), also witnessed intentional signs by Albert.

Krall (1916a, 1916b) and Ziegler (1916) tried to challenge Faustinus with various arguments, but above all they tried to discredit him as an untrustworthy investigator. For instance, Ziegler (1916) wrote that it was surprising that more credit was given to the "conjurer and fortune-teller Faustinus" than to all the scientists who had most accurately observed the horses and had testified that there was no signaling involved. The highly regarded psychologist Friedrich Schumann (1916) replied to Ziegler that "It is usually well recognized that [a person like Faustinus] is more suitable than 'learned' men for discovering the intentional or unintentional assistance of a groom." It seems that even in those days there was awareness that a conjurer is much better at debunking a fraud than any scientist.

Then the Great War came. In 1915, Albert was recruited (Marbe 1916) and Krall dispensed with his stable, as "it has become too heavy a weight for a single man" (*Mitt. d. Gesell. f. Tierpsych.* 1914–1915).

Unfortunately, outside Germany Faustinus's investigations did not receive the attention they deserved, and the question of the intellectual capabilities of the Elberfeld horses remained officially open. For instance, the American psychologist Joseph Jastrow (1920) did not mention Faustinus in his highly skeptical article and wrote that "there has been no definitive examination of the Elberfeld horses."

In any case, the controversy trickled to an end after the war. A silence descended over the Elberfeld horses, which from then on was broken occasionally but without anything new being added to the debate. For his part, Krall (1916b) tried to educate a new horse, the mare Jona, and kept speaking and writing about his horses of old. He insisted that they could reason but added that they were also capable of communicating telepathically in particular conditions. He became more and more involved in parapsychology and spiritism (von den Berg 2008). Karl Krall died in 1929.

A German dog, Rolf, also became very famous in the same years as the Elberfeld horses, and other sapient dogs came after Rolf. They were thought to be even more gifted than the Elberfeld horses but were not supported by leading scientists. In general, the explanations of the believers drifted more and more toward the paranormal. Those who can read Italian can find their stories chronicled in Vezzani (2010). ■

Notes

1. See Sanford (1914) for a more detailed account in English of the performances of the horses.

2. However, Claparède gradually convinced himself that the Elberfeld horses were simply trained animals (Claparède 1913; Heuzé 1928).

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An Indian Test of Indian Astrology

Indian astrologers claim they can tell a person's intelligence from his or her horoscope. But twenty-seven astrologers failed to perform better than chance when given forty horoscopes of intellectually bright subjects and mentally handicapped subjects.

JAYANT V. NARLIKAR

In the world of astrology, India has many claims to fame. It has an astrology fundamentally different from both Chinese and Western astrology,[1] possibly more part- and full-time astrologers than in the rest of the world put together, and the world's longest-running English astrological monthly (*The Astrological Magazine* 1895–2007). Its main government funding agency, the University Grants Commission, provides support for BSc and MSc courses in astrology in Indian universities. And as for the general public, one finds almost universal belief in it.

Indian astronomer and astrology critic Balachandra Rao (2000, 149) notes: "The belief in astrology among our masses is so deep that for every trivial decision in their personal lives—like whether to apply for a job or not—they readily rush to the astrologers with their horoscopes." Likewise, many will consult an astrologer to ensure their marriage date will be auspicious. In 1963, the astrologer's advice, for example, led to a postponement of the wedding of the Crown Prince of Sikkim by a year. A day seen as generally auspicious can thus lead to a large number of weddings taking place, putting severe pressure on facilities like wedding halls, caterers, etc.

Prediction of Events

Western astrologers are generally taught that astrology is nonfatalistic and therefore not a good bet for predicting events. Indian astrologers hold the opposite view, and every astrologer worthy of the name must be able to make such forecasts. Unfortunately, these predictions do not carry any controls. For example, B.V. Raman (1912–1998), publisher-editor of *The Astrological Magazine*, wrote that "when Saturn was in Aries in 1939 England had to declare war against Germany" (note the fatalism) in a work intended "to present a case for astrology" (Raman 1992, 119). However, this reasoning fails to notice that Saturn was also in Aries in 1909 and 1968 when nothing much happened other than overseas state visits by Edward VII and Elizabeth II, respectively.

Indian astrologers often make extreme claims about Indian astronomy, as when *The Astrological Magazine* for March 1984 claimed Uranus, Neptune, and Pluto had been discovered around 500 BC (Rao 2000, 36). But their claims about Indian astrology tend to be even more extreme, as in the August 25, 2003, *Indian Express* wherein Raj Baldev, who claimed to be "an authority on the subject of Astronomy, Astrology, Cosmo-Mathematics and Metaphysics" said that ancient Hindu astrology "is a complete science" where even one million billionth of a second "makes a lot of difference." Skeptics might wonder at this, since it implies that the shadows cast on ancient sundials were routinely positioned to better accuracy than a hundred millionth of the diameter of an atom. Even at night. Can we believe it?

Complexity without End

Indian astrology is more complex than Western astrology, with countless authoritative aphorisms to cover every possible situation. Indeed, the few Western authors who have described it for Western use have typically required decades of study before proceeding. But as one of them has noted: "This is of course natural for a society over 6,000 years old whose elders have not only employed astrology but embraced it" (Braha 1986, x).[2]

And there is no Western equivalent to the ways in which those authoritative aphorisms can be modified via suitably chosen amulets, mantras, colors, gemstones (yellow or blue sapphire is said to strengthen Jupiter or Saturn, respectively), and by performing *yajnas* (a spiritual ceremony involving offerings to fire performed by a Hindu priest). Ironically these modifications specified by the astrologer are essentially fatalistic ways of achieving non-fatalistic outcomes.

Miraculous Nadis

Indian Nadi astrology has many variations, but if any of them worked it would be a miracle. Nadi astrologers, when approached by a client, are found to have a huge collection of horoscopes on ancient palm leaves, one of which

In 1989, I was showing a visitor around my newly established astronomy center in Pune.... At the end, I waited for any questions she may have had. Yes, she did have a question: "Does this computer cast horoscopes?"

turns out to be the client's. But a little thinking shows that it is not as miraculous as it may seem. Consider the following scenario.

After providing birth details during the first visit, the client is asked to return a few days later on the pretext that it will take time to find his horoscope among the thousands held by the astrologer. While the client is away, the astrologer, based on the information supplied by the client, writes his or her horoscope on a fresh palm leaf and soaks it in a slurry of coconut kernels and mango bark, both of which are rich in tannin. This gives the palm leaf an ancient look (Premanand et al. 1993, 331). During the second visit the client is appropriately impressed that his/her horoscope turned up after so many centuries.

Electronic Destinies

In 1984, the first companies to offer computerized horoscopes appeared in India, seventeen years after they had started business in Europe. In twenty minutes (today, in just a few seconds) they could do the calculations that previously took three months. A computer horoscope may cost twenty-five rupees (about fifty cents) for an ordinary one and fifty rupees (about $1) for a longer one, more in big cities or air-conditioned centers. Predictions cost up to 500 rupees depending on the number of years ahead (Rao 2000, 147).[3] Many websites offer free horoscopes; see, for example, www.bestindiansites.com/astrology.

As in the West, Indian astrologers immediately complained that the computer was devoid of intuition and experience, and did not meet their clients' need to talk and vent their feelings. Indeed, about two decades ago an educated young man committed suicide after a computer horoscope predicted total failure in everything he did (Premanand et al. 1993, 307). Nevertheless, as in the West, computer horoscopes seem here to stay.

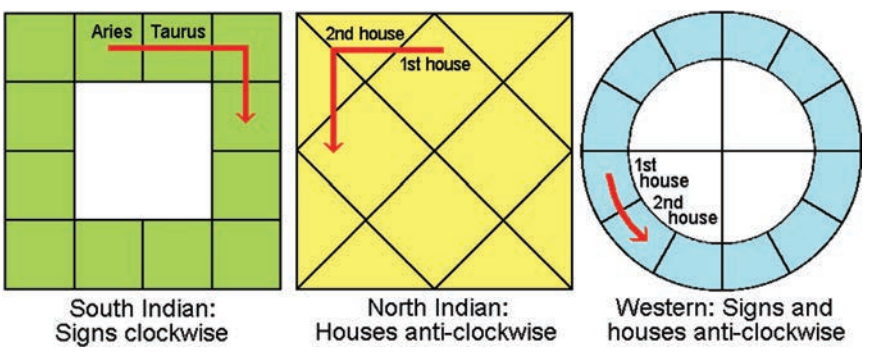
In 1989, I was showing a visitor around my newly established astronomy center in Pune. At that time we had just set up our new computer and I explained its capabilities to the visitor. At the end, I waited for any questions she may have had. Yes, she did have a question: "Does this computer cast horoscopes?"

The Ultimate Accolade

The lobby for Indian astrology had its crowning glory when, in February 2001, the University Grants Commission (UGC) decided to provide funds for BSc and MSc courses in astrology at Indian universities. Its circular stated: "There is urgent need to rejuvenate the science of Vedic Astrology in India ... and to provide opportunities to get this important science exported to the world." Actually, the phrase *Vedic Astrology* is an oxymoron since the prefix *Vedic* has nothing to do with the Vedas, the ancient and sacred literature of the Hindus, which do not mention astrology. In fact, scholars agree that the usual planetary astrology came to India with the Greeks who had visited India since Alexander's campaign in the third century BC.

Within nine months of the UGC's announcement, forty-five of India's 200 universities had applied for the UGC grants of 1.5 million rupees (about $30,000) to establish departments of astrology. Of these, twenty were accepted (Siddhanta 2001, 2). To those Indians who believe that astrological considerations influence the course of their business and family lives—and this category includes leaders of major political parties—the UGC's decision might seem sensible if overdue.

But the decision provoked outrage among India's academics, especially those in the science faculties. More than



Indian horoscopes are a different *shape* from Western horoscopes, and their *signs*, *houses*, and *aspects* are calculated differently. They also differ in how they are *interpreted*. A Western-style interpretation focusing on the owner's personality and motivations would be rejected in India, where clients expect fortune-telling.

100 scientists and 300 social scientists wrote in protest to the government. Of the thirty letters-to-the-editor that appeared in the Indian science journal *Current Science*, most of them from scientists in university departments or research institutes, about half dismissed astrology as a pseudoscience, and a quarter felt that decisive tests were needed. Against this, the rest felt there was nothing wrong with funding something that most Indian people believe in. But the protests were without effect because, in Indian law, Vedic astrology is seen as a scientific discipline.

Nevertheless, in 2004, several scientists asked the Andhra Pradesh High Court to stop the UGC from funding courses in Vedic astrology because it was a pseudoscience, it would impose Hindu beliefs on the education system,[4] and it would reduce the funds available for genuine scientific research. However, the court dismissed their case on the grounds that it was not correct for a court to interfere with a UGC decision that did not violate Indian law.

In 2011, an appeal under the act that bans false advertising was made to the Mumbai High Court. It was dismissed by the court arguing that the act "does not cover astrology and related sciences. Astrology is a trusted science and [has been] practiced for over 4000 years. . . ." (as reported in *The Times of India* February 3, 2011).

Failed Predictions

To justify calling it a science, astrology must fulfil the basic requirement of a scientific theory—it must make testable and correct predictions. Here the performance of astrology in predicting the results of events has been very poor. The nearest we have are follow-ups to predictions of public events such as elections, where failure is the norm. For example, the elections in 1971 were a showdown between Indira Gandhi and her political opponents. *The Astrological Magazine* was filled with predictions by amateurs and professionals, most of whom predicted that Gandhi would lose. In fact, she won with an overwhelming majority.

The 1980 elections attracted another frenzy of predictions, most of which saw Gandhi losing. For example B.V. Raman (whom I discussed earlier), in a rare departure from his usual vagueness, predicted that Gandhi's efforts to regain office "may misfire. Her ability to influence the Government will be disconcertingly limited in effectiveness" and the outcome "may not see a stable Government." An Indian horary astrologer (one who answers questions) predicted that Gandhi "can never become the Prime Minister." However, she won with a huge majority, was prime minister, and formed a very stable government.

Also in 1980, at a large international conference organized by the Indian Astrologers Federation, both the president and secretary of the Federation predicted a war with Pakistan in 1982, which India would win, and a world war between 1982 and 1984. All wrong! These examples and many more are given by Rao (2000, 113–122), who notes that no astrologer predicted Gandhi's assassination in 1984, and that the golden rule seems to be "predict only those things which please the listener's ego."[5]

Lack of Criticism

In the West, books critical of astrology are not hard to find, but in India the reverse is true. Some excellent books exist, such as Premanand et al. (1993) and Rao (2000), but all are hampered by a lack of Indian tests with which to counter true believers. Even *Current Science* had to wait until Manoj Komath's (2009) review, which drew heavily on Western sources such as the critical but user-friendly www.astrologyandscience.com. Unfortunately, given the low level of income and high level of illiteracy of the masses, web sources may not be very effective in general.

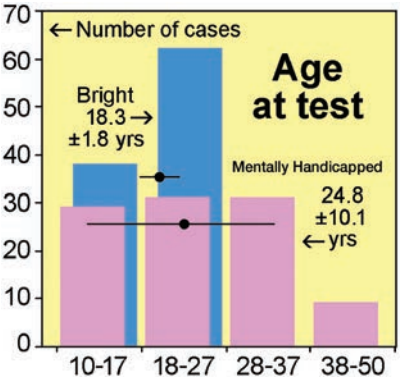
UGC's funding of astrology might have been justifiable had Indian astrology ever been a source of new knowledge (it hadn't; see Siddhanta 2001, 13), or if its modus operandi had been verified by controlled tests. But unlike astrology in the West, where several hundred controlled tests have found no support commensurate with its claims (Dean 2007), astrology in India had hitherto been without controlled tests, even though its focus on predicting yes/no events would make testing easy.[6] I will now describe a controlled test that my colleagues and I conducted recently.

Our Experiment

Our experiment was performed in the university city of Pune (formerly Poona) about 160 km (100 miles) southeast of Mumbai (formerly Bombay) in the state of Maharashtra, which is the second-largest in population and third-largest in area of India's twenty-five states. Pune itself has a population of about 3.5 million.

For the experiment I was assisted by Professor Sudhakar Kunte from the Department of Statistics at Pune University, Narendra Dabholkar from the Committee for the Eradication of Superstitions, and Prakash Ghatpande a former professional astrologer who has subsequently turned into a critic of astrology.

Indian astrologers claim that they are able to tell intelligence from a person's horoscope. So volunteers from the Committee for the Eradication of Superstitions went to different schools and collected the names of teenage school children rated by their teachers as mentally bright. They also collected names from special schools for the mentally handicapped. The destinies of these cases could hardly be more different, so they were ideal for testing the above claim. From the collected data we selected 100 bright and 100 mentally handicapped cases whose age distribution is shown below.



Breakdown by age of our 100 + 100 test cases. About half of the mentally handicapped cases are older than our bright teenagers, which could have provided cues but evidently didn't.

Birth details were obtained from their parents because birth certificates are rare in India. Professional Indian astrologers routinely assume that birth details provided by parents are correct, so our procedure followed the norm. Each horoscope (birth chart) was calculated by one of us (PG) using commercial astrological software. All horoscopes were coded and stored in safe custody by Professor Kunte at Pune University, so that neither the experimenters (our group of four) nor the astrologers could know the identities of the individuals.

If the astrologers could tell intelligence from a person's horoscope, they would score at least twenty-eight hits out of forty. . . . The average for all twenty-seven astrologers was 17.25 hits, less than the twenty expected by chance (e.g., coin tossing).

Publicity

We announced our experiment at a press conference in Pune May 12, 2008, and invited practicing astrologers to take part. We explained that each participant would be given forty horoscopes drawn at random from our set of 200 and would have to judge whether their owners were mentally bright or handicapped. We also invited established astrological organizations to take part, for which they would be given all 200 horoscopes, a respectably large sample size.

The press conference, which was reported in almost all local and regional newspapers, proved to be an efficient way to reach astrologers. Within a few days we received about 150 telephone calls from astrologers all over Maharashtra expressing interest. We asked them to send us their names, experience, and method of prediction used, together with a stamped self-addressed envelope for mailing the forty horoscopes. They were then allowed one month for making their judgments. In due course, fifty-one astrologers asked for horoscopes, of which twenty-seven from all over Maharashtra sent back their judgments. The rest did not tell us why they chose not to participate.

Objections

Astrologers from the Pune and Maharashtra astrological societies expressed concern that, because the data had been collected by skeptics, the experiment would be biased. We assured them that the skepticism of data collectors had no active role in running the experiment, and that the experiment was of the double-blind kind to make sure it was entirely fair. But they were not convinced, and tried (unsuccessfully) to dissuade other astrologers from participating.

A month later, at a Pune astrological seminar, we explained that tests, indeed many tests, are necessary if astrology is to establish itself as a science. The organizer then said he could provide a set of ten rules that would tell whether a horoscope's owner was mentally bright or handicapped, and urged the astrologers present to participate in our experiment.

In India, leading astrologers have their own astrological organizations, and so we wrote to those on our list (about a dozen) inviting them to judge all 200 horoscopes. Two responded with expressions of interest, of which one sent in its judgment. The other remained silent.

An Interesting Sub-Test

Although the Maharashtra Astrological Society had urged astrologers to boycott our experiment, its president kept meeting with us. Among other things he gave us a rule for predicting sex and another rule for predicting intelligence, both of which he claimed were correct in 60 percent of cases. But when applied to our set of 200 horoscopes, the predictions were respectively 47 and 50 percent correct, which offers no advantage over pure guessing or tossing a coin.

Results of Our Main Test

Of the twenty-seven astrologers who participated, not all provided personal details, but fifteen were hobbyists, eight were professionals, nine had up to ten years of experience, and seventeen had more than ten years of experience. So they clearly formed a competent group. Their average experience was fourteen years.

If the astrologers could tell intelligence from a person's horoscope, they would score at least twenty-eight hits out of forty. In fact the highest score was of twenty-four hits by a single astrologer followed by twenty-two hits (by two astrologers). The remaining twenty-four astrologers all scored twenty hits or less, including one professional astrologer who found thirty-seven intelligent and three undecided (so none were mentally handicapped!), of which seventeen were correct. The average for all twenty-seven astrologers was 17.25 hits, less than the twenty expected by chance (e.g., coin tossing) and well within the difference of ± 3.16 needed to be statistically significant at

$p = 0.05$. So much for the benefits of their average fourteen years of experience! Certainly no scientific theory would survive such a poor success rate!

The institution whose team of astrologers had judged all 200 horoscopes got 102 hits, of which fifty-one were bright and fifty-one were mentally handicapped, so their judgments were, again, no better than tossing a coin.

Tragically, our statistician, Sudhakar Kunte, died in an accident in 2011, and the security he imposed on data storage has so far made it difficult for us to perform further tests, such as whether the astrologers agreed on their judgments, whether they could pick high IQ better than low, and whether the three astrological methods used (Nirayan, Sayan, Krishnamurty) differed in success rate. We hope that the access to this data will eventually be possible.

Only two tests of Western astrologers have involved the judgment of intelligence. In Clark (1961) twenty astrologers averaged 72 percent hits for ten cases of high IQ paired with cerebral palsy, but this famous result could not be replicated by Joseph (1975), where twenty-three astrologers averaged only 53 percent hits for ten cases of high IQ when paired with the severely mentally handicapped. In any case the sampling error associated with $N = 10$ is more than enough to explain both results, which is consistent with the dozens of other tests that have been made of Western astrology (Dean 2007). It is also consistent with the few tests of Western astrologers who practice Vedic astrology, for example Dudley (1995).

Conclusion

Our experiment with twenty-seven Indian astrologers judging forty horoscopes each, and a team of astrologers judging 200 horoscopes, showed that none were able to tell bright children from mentally handicapped children better than chance. Our results contradict the claims of Indian astrologers and are consistent with the many tests of Western astrologers. In summary, our results are firmly against Indian astrology being considered as a science.[7]

Acknowledgments

The Department of Statistics, Pune University, and the Inter-University Centre for Astronomy and Astrophysics, Pune, provided infrastructural support while this experiment was being conducted. A brief account appeared in *Current Science* 96(5), 641–643, 2009. My special thanks to Geoffrey Dean of Perth, Western Australia, for providing information on tests of Western astrology as well as giving me a general background of astrology in the West versus the East.

Notes

1. Babylonian omen ideas arrived in India around 450 BC during the Persian occupation, followed, around 200 AD, by Greek astrological ideas based on planets. To these were added new ideas to suit Indian culture. The end result was largely the Indian astrology still in use today, which exists in numerous schools disagreeing over details (most schools of astrology, Indian or Western, disagree over details). The main differences from Western astrology are a preoccupation with reincarnation and karma, use of the sidereal zodiac instead of the tropical zodiac (they now differ by nearly one sign due to precession), exclusion of the non-classical planets Uranus, Neptune, and Pluto in favor of the two lunar nodes Rahu and Ketu, use of twenty-seven lunar mansions or nakshatras, and progressively smaller and smaller subdivisions of the signs (Dean et al. 1995 and Rao 2000).

2. Braha (1986, xiii) warns that the complexity can be dealt with only by intuition and experience, so Indian astrology cannot be properly learnt from books. But tests of Western astrologers have found that neither self-rated use of intuition nor experience raise their success rate above chance (Dean and Kelly 2003). So why should Indian astrologers be any different?

3. At one time Rao ran a computer horoscope service but without predictions. It was "only to prove to 'omniscient' astrologers that a confirmed anti-astrologer can also do what astrologers do, and with greater efficiency and knowledge." His charge for fooling you was thirty rupees.

4. According to ancient Hindu texts, each believer has 8,400,000 rebirths from which they are released only by attaining enlightenment. At say, fifty years per birth, and no change over time, the allocated rebirths span more than 400 million years, roughly the age of the earliest hominids.

5. More examples can be found in Premanand et al. (1993) and also via Internet search engine, albeit with a need to persevere in your searching. For starters, try searching for "*astrology michael prabhu*."

6. But some come close. For example Rakesh Anand (2010) used astrology to make several important decisions in his life, but the results were disastrous. So he prepared horoscopes for twenty-four celebrities and nine personal friends, changed their names, and was able to get 101 astrologers from everywhere in far northern India to predict their life and events. But none succeeded. For example, they predicted no political career from the horoscope of George Bush and no big money from the horoscope of Bill Gates. He concluded, "astrology is a misleading and useless superstition" (6). He also offered a prize of one million rupees (about $20,000) to any Indian astrologer who could demonstrate that astrology works, so far with no takers. For details, visit www.godvslife.com.

7. Over the years I have made many public statements against the pseudoscience of astrology, which earned me a chapter titled "The Narlikar Episode" in a 348-page, 1998 book *Astrology and the Hoax of "Scientific Temper"* by the astrologer Gayatri Devi Vasudev, then editor of *The Astrological Magazine*. Her book tries to show that scientific inquiry or "scientific temper" is prejudiced against astrology, and that critics are quite ignorant of both science and astrology. The above chapter accused me of venturing into areas I had not investigated and was therefore ignorant of. For example, I had made the supposedly inexcusable mistake of declaring that astrology was not a science. I hope the present investigation can set the record straight.

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Understanding Believers' Cognitive Dissonance

Dealing with believers of superstition, pseudoscience, and religion can be difficult for skeptics because it is hard to understand why intelligent people believe in irrational things. Understanding cognitive dissonance theory can help skeptics understand the psychology of irrational belief and perhaps better deal with believers.

JAMES WALKER

Skeptics take great pleasure in talking and debating with each other. We spend hours every day on online skeptical forums, blogs, and websites. We meet together at the pub, at meetings with our local skeptical groups, and at conferences.

We, being social animals, thrive and crave this interaction with other like-minded individuals. The reality, though, is that we must live in a world of believers of superstition, religion, and pseudoscience. We interact with these believers all the time and, for the most part, their beliefs do not come into play in the interactions we have. Instances occur, however, when we find ourselves having to deal with someone whose beliefs cross swords with our skepticism. Perhaps it comes up in a conversation at a party or social gathering. Maybe this person is a friend and the conversation has strayed into uncharted territory, and we are surprised to find that the friend holds a superstitious or pseudoscientific belief.

We have different kinds of relationships with believers, from casual to intimate. How we deal with believers depends, to some degree, on the depth and importance of our relationships with them.

Before going further, we need to understand what a believer is. Wikipedia has a nice definition of belief that I happen to like and that I think serves my purposes well here:

> To "believe in" someone or something is a distinct concept from "believe that." There are two types of belief in:
>
> Commendatory: an expression of confidence in a person or entity, as in, "I believe in his ability to do the job."
>
> Existential claim: to claim belief in the existence of an entity or phenomenon with the implied need to justify its claim to existence. It is often used when the entity is not real or its existence is in doubt. "He believes in witches and ghosts" or "many children believe in fairies" are typical examples.

The difference between to believe *in* and to believe *that* is relevant in this context. We all have things that we believe *that* might be, usually based on our knowledge, experience, and evidence. I can believe that the sun rises in the east because my knowledge (knowing how Earth rotates), my experience (having seen countless sunrises), and the evidence (I can test this by using a compass to show that the sun does, indeed, rise in the east) tells me this is true. Alternatively, I might believe that my son will be successful in a career as a salesman because he has shown a particular talent in persuading people to do things he wants them to do.

People who believe *in* things are the ones I am discussing here. In particular, I am referring to people whose worldview and sense of identity are deeply tied to their belief *in* something, be it religion, pseudoscience, or superstition.

What makes many believers so staunch in their beliefs? Why do they persist in their beliefs, even in the face of reason, logic, and evidence? The reason I discuss here is cognitive dissonance.

Cognitive dissonance is a theory first proposed by Leon Festinger in the 1950s. Festinger theorized that when an individual holds two or more ideas that are related but inconsistent with each another, the inconsistency creates a state of discomfort (Harmon-Jones and Harmon-Jones 2007). "Because dissonance is uncomfortable, people will try to reduce it by changing one or both cognitions to make them more consonant with each other" (Festinger et al. 1956).

Festinger famously tested his theory by studying a UFO cult that believed that there would be a great flood on December 21, 1954, and that a flying saucer would save them. When the prophecy failed to transpire and December 21 passed with no flood and no flying saucer, the members of the group became even more dedicated to their beliefs. The reasons were that most of them had gotten rid of all their possessions and had surrendered everything to

their belief in the prophecy. They rationalized the truth away by telling themselves that their sincere commitment stopped the flood from happening, and that this proved that they were right to believe.

Festinger gave five conditions under which we expect to observe increased fervor following the disconfirmation of a belief:

1. A belief must be held with deep conviction, and it must have some relevance to action, that is, to what the believer does or how he behaves.
2. The person holding the belief must have committed himself to it; that is, for the sake of his belief, he must have taken some important action that is difficult to undo. In general, the more important such actions are, and the more difficult they are to undo, the greater is the individual's commitment to the belief.
3. The belief must be sufficiently specific and sufficiently concerned with the real world so that events may unequivocally refute the belief.
4. Such undeniable disconfirmatory evidence must occur and must be recognized by the individual holding the belief.
5. The individual believer must have social support. It is unlikely that one isolated believer could withstand the kind of disconfirming evidence we have specified. If, however, the believer were a member of a group of convinced persons who can support one another, we would expect the belief to be maintained and the believers to attempt to proselytize or to persuade nonmembers that the belief is correct.

Throughout history, there have been many examples of groups of people encountering the above five conditions with the same results. Most we are unable to confirm with any certainty given the lack of record keeping and unwillingness of the participants of these groups to admit to failed prophecy. However, Festinger gave several examples in his book *When Prophecy Fails*, providing evidence to support his theory.

One of these groups was the Millerites during the nineteenth century in the United States. They believed, based on a specific reading of the Bible, that the second coming of Jesus would occur sometime between March 21, 1843, and March 21, 1844. Thousands of people came to believe this prophecy, and many gave away everything they owned in preparation for the coming of their Lord. After the March 21, 1844, date passed, most of the Millerites lost their faith, but some searched the Bible and found passages that they felt explained why the original dates were inaccurate.

Some Millerites concluded that Miller's interpretation was flawed and that it instead foretold of Christ's entrance into the heavenly sanctuary rather than his second coming. This group came to be called The Adventists and they continued to believe that Christ's second coming was imminent, but they refused to set further dates for the event.

Another fascinating example is that of Sabbatai Zevi, a Jew in Smyrna in the seventeenth century who claimed to be the messiah and had thousands of Jewish followers throughout Europe. When he proclaimed he would soon fulfill his purpose and lead the Jews of the world back to the Holy Land, "The Jews accordingly prepared seriously to return to their original home. In Hungary they began to unroof their houses. In large commercial cities, where Jews took the lead in wholesale business, such as Amsterdam, Leghorn, and Hamburg, stagnation of trade ensued" (Festinger et al. 1956).

The Sultan finally imprisoned Sabbatai in Constantinople because he had arrived there in an effort to force the beginning of his messianic mission where thousands of people hailed him as the messiah.

> Finally, in an effort to cope with the problem, without making a martyr of Sabbatai, the Sultan attempted to convert him to Islam. Astonishingly enough, the plan succeeded and Sabbatai donned the turban. Many of the Jews of the Near East still kept faith in him. Explanations were invented for his conversion and many continued their proselyting, usually in places where the movement had not previously been strong. A considerable number of Jews even followed his lead and became Moslems. His conversion proved to be too much for most of his followers in Europe, however, and the movement there soon collapsed. (Festinger, et al. 1956)

We have seen modern examples of this phenomenon in groups such as Heaven's Gate and Reverend Jim Jones's Peoples Temple, where people willingly killed themselves and their children because they had literally invested everything—including their very beings—into their belief system.

We can see by these examples how easily people can surrender everything they have, giving up possessions, relationships, and family to pursue their beliefs. The more they sacrifice, the greater the cognitive dissonance and the stronger their belief becomes, even after failure of the prophecy is obvious. They become so invested in their beliefs that they will latch onto any explanation, no matter how far-fetched, that reinforces their beliefs to which they have surrendered so much.

We have seen modern examples of this phenomenon in groups such as Heaven's Gate and Reverend Jim Jones's Peoples Temple, where people willingly killed themselves and their children because they had literally invested everything—including their very beings—into their belief system. Not even the idea of death was enough to dissuade them; to the contrary, they saw death as part of God's plan for them and their eternal salvation.

For the religious beliefs of the average person, cognitive dissonance—while not nearly as strong as it may be in the above situations—is very strong. People who believe deeply or people raised in certain belief systems have much of their sense of self invested in those beliefs.

The reactions of believers when their beliefs are questioned are varied, but often the knee-jerk reaction is to become defensive. They may engage in *ad hominem* attacks on the person questioning their beliefs, or they may attack the questioner's beliefs instead of addressing the questions raised about their beliefs. They often engage in evangelistic activities with questioners, attempting to convince them of their beliefs by quoting scripture or appealing to the authority of the Bible, the church and its leaders, or God himself. All of these arguments are, of course, common logical fallacies that use circular reasoning to make their arguments: "My belief in God must be right because the Bible says so, and God wrote the Bible," is one such example.

To engage a believer in a productive discussion about their beliefs, it helps to understand that the person may be suffering from significant cognitive dissonance. I believe letting the person know that while I do not agree with their belief, I respect their right to say and believe as they choose is very important. I do not mean that we, as skeptics, have to respect their ideas, thoughts, or actions, but we need to respect their rights to free expression and belief, and we should express to them our respect of those rights.

In *When Prophecy Fails*, Festinger says: "... through the mocking and scoffing of nonbelievers there is usually established a heavy commitment on the part of believers ... the jeering of nonbelievers simply makes it far more difficult for the adherents to withdraw from the movement and admit that they were wrong."

If we merely mock or make light of a believer's beliefs, without also expressing our respect for their right to hold those beliefs—no matter how absurd the beliefs may be—we will most likely drive them deeper into their mindset. While we say that we want others to respect our beliefs, what we really mean is that we want them to respect us as individuals. The reality is that the only thing we need to respect in our dealings with anyone, including believers, is respect for their rights to hold and express their beliefs. Other than that, we should not feel bound to hold back on criticizing their beliefs. If, however, we show that we have respect for their rights to believe and express their beliefs, then we have the beginnings of a meaningful discussion. ■

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James Walker currently works in the IT field but is pursuing a career as a writer. He is the author of the *Freethinking for Dummies* blog at http://freethinkingfordummies.com.

[SCIENCE WATCH KENNETH W. KRAUSE Innate Morality? Babies Weigh In

(Continued from page 31)

over characters who take them and run away (Hamlin and Wynn 2011).

More recently, Hamlin's new team claimed to demonstrate that, like adults, babies interpret others' actions as positive or negative depending on context (Hamlin et al. in press). In this particularly chilling report, infants were found to prefer both individuals who helped others with attitudes (tastes in food) similar to their own, and individuals who *hindered* others with different attitudes.

Scarf stands firm, however. He finds it implausible, for example, that ten-month-olds would consider such small differences between stimuli significant. Regardless, his team had also replicated Hamlin's 2007 results when the climber was made to bounce at the top of the hill—an unlikely outcome, Scarf chides, if their stimuli were—as Hamlin claims—somehow deficient.

He argues as well that Hamlin et al.'s more recent experiments, though admittedly altered in design, suffer from the same general confound as the originals. In one case, the protagonist was made to dive toward a rattle in helping trials—an "interesting" event, according to Scarf, while the hinderer was made to slam a box closed in hindering trials—an "aversive" event.

Though already extensive, Hamlin's explorations into infant prosociality will continue. For his part, Scarf intends to author a review of the existing literature. Defending parsimony is an honorable cause, of course, and the New Zealanders have succeeded in raising important questions for further research. Are we innately moral, or is prosociality primarily learned? Are we naturally discriminatory and intolerant, or must those behaviors be taught and learned as well? ■

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Closing the Book on 'Open-Mindedness'

KATJA PETROVIC

"You're just closed-minded."

Has this accusation ever been leveled at you? I found myself at the receiving end of this comment during a heated conversation with my dear mother (the subject of the conversation, by the way, was astrology). I reeled—this was coming from someone who thinks that walking around the house barefoot will cause you to get a "womb cold" and not be able to have children (and who will defend this by saying that it must be true because her grandmother said so). That aside, I decided to delve further into this notion—because I would hate to be too closed-minded to consider the possibility of being closed-minded (get your head around that one!).

I should mention that I am a skeptic and an atheist. I am also a psychologist and as such am well aware of the placebo effect, confirmation bias, and other phenomena with which I work every day. I think science is wonderful because it's a great way of getting to the truth and learning new things about ourselves and the world in which we live. My mother is also a psychologist, but this is where our mentalities part ways: she is into astrology, alternative therapies, life energy, feng shui, and womb colds. She believes that science is a faith, just like religion. Her method of determining the truth behind these disciplines is not based on evidence because she does not trust "research" or "science" but rather on what sounds good to her. Or perhaps things her grandmother used to say. In her mind, I am closed-minded and she is open-minded. Could this be true?

At least my mom and I can agree on one thing: being open-minded is something worth striving for. But what exactly does being "open-minded" mean? Generally it means being open to considering new and different ideas. This, I suppose, is where people get confused about being "open-minded" and being "gullible." Open-mindedness is not believing everything you hear; it is having a healthy middle-ground of accepting some things and rejecting others. But how do we determine which claims we should believe and which we should throw on the proverbial rubbish heap? The simplest way is to ask, "How likely is this to be true?" This is where science can help us gather enough evidence to decide whether to accept or reject an idea.

Without evidence, there is only the blind belief that something is true even though there is no proof to show that it is. But surely this is the very definition of gullibility—believing something without any good reason to do so. The more I thought about it, the more being gullible seemed closed-minded, as there is nothing that can change your belief. Compared to this, science is the more flexible option—if there is good evidence to contradict your view, then you must take on the new way of thinking. History is full of examples of people collectively changing their beliefs due to scientific findings: think evolution, the big bang theory, and climate change to name a few. The Brontosaurus is now the Apatosaurus, and who can forget saying goodbye to Pluto's planetary status? We used to treat children's ailments with morphine, believed that sick people needed to be bled, and thought that women became hysterical because their wombs were moving around in their bodies. And scientific evidence against these beliefs is the reason we changed our minds. Now compare this to people's faith in alternative remedies, astrology, or feng shui. My mother's belief in these practices will never budge because it is not based on any reliable foundation and thus cannot be disproved.

Let me clarify one more thing. I still remember trying to predict my day by reading horoscopes. I also used to think that walking around barefoot might jeopardize my childbearing chances, and I even good-naturedly tried a few drops of homeopathic solution here and there. I wasn't always averse to these ideas; I considered them, tried them, and then decided to reject them for lack of evidence that they worked.

So who is the open-minded one? ■

Katja Petrovic lives in Melbourne, Australia, and is currently undertaking a master's degree in psychology at Monash University.

Help! I'm Being Followed by Ancient Aliens!

KENNETH L. FEDER

The Palatki site is located in the Coconino National Forest, just west of Sedona, Arizona. In a region where people can visit the massive cliff dwellings of Mesa Verde, few bother making the trip to this tiny jewel of a place with its swirl of massive red rocks enveloping the living space of the ancient Sinagua people. Only about fifty or sixty tourists visit the site each day, so at any particular time you have the place pretty much to yourself and the one or two volunteer docents who monitor it.

As a result, I was more than a little surprised during a recent visit when a tour group approached, huffing and puffing up the trail to the site. I was even more surprised when one of the people in the group walked up to me as I was admiring one of the beautiful ancient rock art panels and said: "Hey! I recognize you! You're an archaeology professor, aren't you? I've seen you on TV."

Imagine my reaction. I'm six miles up a dirt road in the middle of Arizona, and my television fame precedes me! I replied politely, even enthusiastically, "Yup. That's me."

"Wow! How wonderful running into you here. I just saw you on a show about that scientist who believes in ancient astronauts. What's his name?"

"Do you mean Erich von Däniken?" I asked.

"Yeah, that's the guy. Von Däniken."

"Von Däniken isn't a scientist. He's a fantasy writer as far as I'm concerned."

"Well, you really should reconsider your skepticism. After all, there's some very good evidence for those ancient astronauts visiting Earth. First of all, how do you explain the fact that the Maya had a base-12 number system? Doesn't that prove that the Maya were an alien race with six fingers on each hand?"

"Actually that's not the case," I pointed out, "the Maya didn't have a base-12 system. Theirs was a base-20 system."

"Okay, base-12, base-20. Whatever. It's just that the Maya system allowed them to count so high, so much higher than would be necessary for a simple farming people. It just doesn't make any sense."

"Look," I patiently explained, "the Maya developed an impressive numerical system. So what? The fact that they could count high is in keeping with their brilliant architectural, artistic, en-

Imagine my reaction. I'm six miles up a dirt road in the middle of Arizona, and my television fame precedes me! I replied politely, even enthusiastically, "Yup. That's me."

gineering, and calendrical achievements. The Maya were smart. That proves they were, well, smart. That doesn't prove they were extraterrestrials."

"Oh, okay. Well, I just think you need to keep an open mind."

"My mind is open, always; I just haven't seen any evidence to support the ancient astronaut hypothesis."

We shook hands and, grinning, my new friend walked away.

My encounter exemplifies so much of what is wrong about the ancient astronaut belief. Let's ignore the inconvenient fact that there is absolutely no material, archaeological evidence for it: no laser guns found in neat stratigraphic context next to the bones of woolly mammoths, no light sabers secreted in Egyptian tombs, and no Star Trek–style communicators reverentially placed in Hopewell burial mounds. There's another thing just as fundamentally wrong here: There is no need for a hypothesis of technologically sophisticated aliens dispensing knowledge to ancient human beings.

The archaeological record shows clearly that our human ancestors were enormously intelligent and resourceful. They were more than capable of developing sophisticated technologies on their own. Rather than exhibiting a pattern of new ideas appearing magically and without antecedents at ancient sites, the actual record shows lengthy developmental sequences—in the domestication of plants and animals, the evolution of Egyptian pyramids, metallurgy, and so on. The development of these things didn't occur overnight; they weren't "airlifted" to Earth from another planet. Instead, the stories of these accomplishments are filled with the very human pattern of trial and error, fits and starts, missteps and leaps forward.

To assume that the achievements of ancient humanity were made possible by visitors from outer space is to grossly underestimate the intelligence and capabilities of our ancestors and to ignore the enormously fascinating actual archaeological record.

And you don't need six fingers on each hand to understand that. ■

A dwelling of the ancient Sinagua people in the Coconino National Forest (top). Ancient rock art panel of the Sinagua people (bottom).

Kenneth L. Feder is author of *The Encyclopedia of Dubious Archaeology* and *Frauds, Myths, and Mysteries: Science and Pseudoscience in Archaeology*. He is professor of anthropology at Central Connecticut State University and a Committee for Skeptical Inquiry fellow and Skeptical Inquirer consulting editor. This first appeared on the *Ohio Archaeology Blog*, ohioarchaeology.blogspot.com.

Perpetual Discussion!

MARK LEVY

As a patent attorney, I am occasionally approached by a client with an idea for an apparatus or method to achieve perpetual motion. Writer Dimitry Rotstein recently stated ("The Perpetual Quest," *SKEPTICAL INQUIRER*, September/October 2011) perpetual motion devices are intended to generate persistent motion with no energy source. They are expected to run forever. This, of course, is a violation of the First Law of Thermodynamics, which states that energy cannot be created but may only be converted from one form to another. True, Einstein modified the First Law by proving that energy can be converted from mass, but, as far as physicists know, neither mass nor energy can be created *ab initio*.

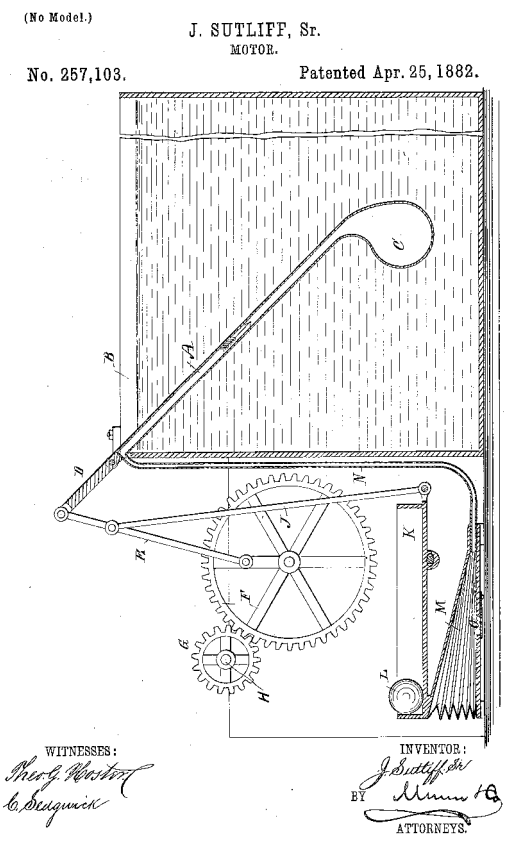

Figure 1. Design for a perpetual motor granted a patent in 1882

When clients who seem normal in every other respect describe their perpetual motion machines with a view toward obtaining a patent, they invariably grow animated, defensive, and, of course, possessive. Curiously, this by itself is not an unusual occurrence in a patent attorney's office. A certain degree of paranoia is actually healthy for an inventor, since an inventor cannot obtain a patent if the inventive idea was disclosed more than one year prior to filing the patent application. I often say my clients come in one of two flavors: paranoid and very paranoid.

In the eighteenth and nineteenth centuries inventors tried to work with simple machines—levers, weights, counterweights, wheels, pendulums, magnets, and liquids—to do more work than could normally be performed with the energy provided to the system.

Although the United States Patent and Trademark Office is obligated to reject patent applications that violate laws of nature, occasionally patent examiners make mistakes. Consider U.S. Patent No. 257,103 (Figure 1), issued on April 25, 1882, to John Sutliff Sr. for "Motor." A water tank, B, has a pivoting tubular lever, A. The long, hollow arm of the lever, A, terminates in a bulb or hollow vessel, C. The other, shorter arm, D, of the lever is connected by means of a connecting rod, E. Rod E has a cog wheel, F, engaging with a pinion, G, mounted on a shaft, H, which is to be driven. A pivoted box, K, is connected both to the connecting rod, E, and to a pivot point (unlabeled). Disposed on the upper surface of the box, K, is a heavy ball, L, that is free to roll from side to side. The underside of the box, K, is attached to a bellows, M, from which a flexible tube, N, leads to a hollow shaft of tubular lever, A.

In operation, the bulb or vessel, C, is filled with air and naturally floats in the water tank, B. This lowers the shorter arm of the lever, D. Cog wheel, F, and pinion, G, are rotated, while the right side of box, K, is lowered, so the ball, L, rolls to the right side of the box, K, increasing the weight on that right side of the box, K. As one end of the box, K, is lowered, the left side of the box attached to the bellows, M, is raised, whereby all of the air is removed from the bulb, C, and lever tube, A, causing the bulb, C, to sink. The shorter arm, D, of the lever, A, is thereby raised, and the wheel, F, which has made a half revolution when the lever, A, and bulb, C, were raised, will now complete its revolution. The box, K, is tilted again, the ball, L, resting on it rolls to the left, compressing the bellows, M, and forcing the air into the bulb, C, and tubular lever, A, causing the same to rise, etc. In this way, the bulb, C, continues to rise and fall; ball, L, continues to reciprocate between the extremes of box, K; bellows, M, continues to expand and compress; cog wheel, F, continues to rotate; and shaft, H, continues to turn in one direction. All of this supposedly goes on for an indefinite time, without applying further energy to the system. Needless to say, an actual, working motor was never built.

By the twentieth century, inventors graduated from mechanical devices to theories for conserving or creating energy that relied on electricity and even nuclear power. In the last few years, for example, I have seen a proposed system for operating an electric car indefinitely without a battery charge, a symbiotic electric motor/generator system that will never run down, and a nuclear generator that the inventor believed would last as long as its electrically conductive wires could be maintained at absolute zero, with zero resistance.

On May 19, 1959, once again the Patent and Trademark Office granted a patent, No. 2,886,976 (Figure 2), for a perpetual motion machine. The inventor was Norman L. Dean and the patent title was "System for Converting Rotary Motion into Unidirectional Motion." Through an elaborate system of gears, clutches, counterweights—and, oh yes, electromagnets—Dean convinced the Patent Office examiner that his sky hook was patentable.

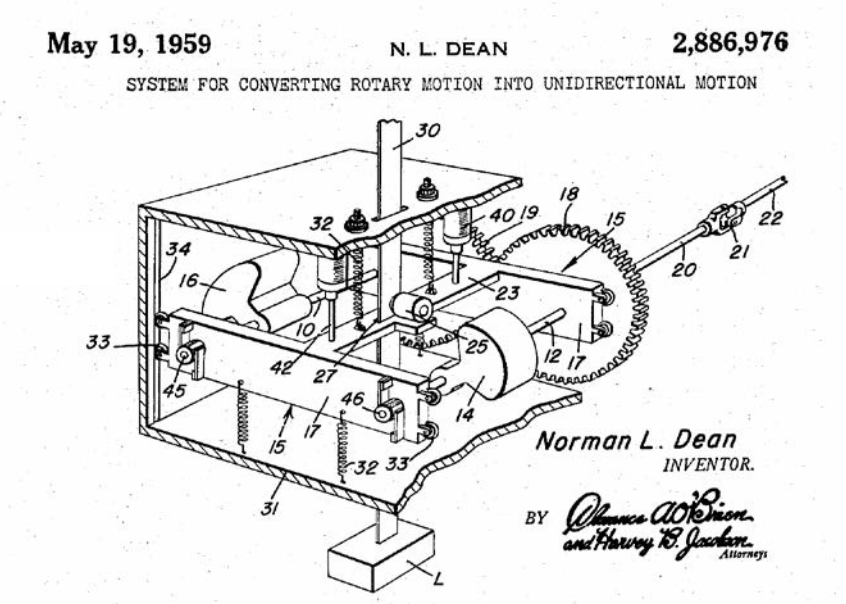

Figure 2. Design for a perpetual motion machine granted a patent in 1959

Simply stated, Dean's invention included

> an oscillatory movement of a freely suspended inertia mass or of a plurality of such masses . . . produced by the rotation of a mass or masses around an axis or axes and by limiting the degrees of freedom of movement of said freely suspended mass or masses, and in which the oscillatory movement of the system produces a continuous series of unidirectional impulses which may be transmitted to a suitable load device or which may act on the carrier of the system itself, without however reacting on or otherwise influencing the frequency or amplitude of the said oscillatory movement.

Dean's patent is not a testament to the principle that perpetual motion machines work, but that, with enough electromechanical legerdemain, even people trained in technical fields can be fooled.

The best way to handle an inventor who is convinced that his or her perpetual motion machine will work is for the patent attorney to request a working prototype. The next step is for the attorney not to be surprised when the inventor doesn't return. ■

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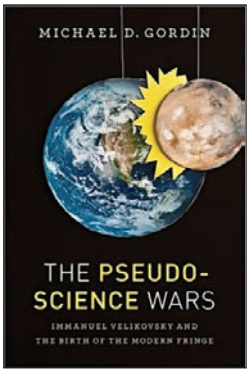
The Parameters of Pseudoscience

DAVID MORRISON



The Pseudoscience Wars: Immanuel Velikovsky and the Birth of the Modern Fringe.
By Michael D. Gordin. University of Chicago Press, Illinois, 2012.
ISBN: 978-0226304427. 304 pp. Hardcover, $29.00

Skeptics often say they are trying to expose pseudoscience, but in reality we tend to use this term loosely. Creationism, homeopathy, alternative medicine, and cold fusion are clearly pseudoscientific, but what about ancient aliens, UFOs, alien abductions, Bigfoot, crystals, the Moon hoax, and many other claims investigated in the pages of the SKEPTICAL INQUIRER? Are these examples of pseudoscience, just bad science, or perhaps not related to science at all?

One definition of pseudoscience presents it as claims that are presented as scientific but do not adhere to valid scientific method. Another describes pseudoscience as the misuse of methods that seem scientific in order to undercut real science. In his excellent new book *The Pseudoscience Wars: Immanuel Velikovsky and the Birth of the Modern Fringe*, Princeton historian Michael D. Gordin asserts that scientists only apply the label of pseudoscience—which he defines as "doctrines that are non-science but pretend to be, or aspire to be, or are simply mistaken for scientific"—to ideas that they feel are threatening because of their public appeal. It is the way pseudoscience masquerades as real science and is used to attack real science that sets it apart from the easily dismissed claims of cranks and charlatans.

No advocate for an unorthodox perspective ever calls his or her work pseudoscience. This is a term of opprobrium, assigned by scientists who are defending the consensus. Gordin notes that in practice, the term *pseudoscience* is generally reserved for ideas that are perceived as major challenges to science—especially in the eyes of the public. Less threatening ideas are simply labeled as bad science or non-science, on the assumption that they will self-destruct and be quickly forgotten.

Gordin's highly readable book examines in detail several twentieth-century examples of pseudoscience. Major emphasis is on the pseudocosmologist Immanuel Velikovsky. His other prime examples are Trofim Lysenko, who nearly destroyed mid-century Russian genetics, and the advocates for Biblical creationism who attempted to establish a scientific basis for a planet less than ten thousand years old. Lysenkoism was a threat because of the personal support given by Stalin and the Soviet Communist Party, which virtually outlawed research that challenged Lysenko and thereby had a strong negative impact on Soviet agriculture. In a sense, Lysenko could be held responsible for the death of millions in the U.S.S.R. The creationist authors who developed "flood geology," primarily George McCready Price, Henry Morris, and John Whitcomb, have been (and continue to be) a threat because of support by Christian fundamentalists who use these ideas to attack evolutionary biology in particular and science in general. Velikovsky is different, in that he achieved substantial fame and influence on his own merits without the support of any organized religious or political institutions.

Many readers of the SKEPTICAL INQUIRER are familiar with the outlines of Velikovsky's rise and fall. Gordin had access to the complete Velikovsky archives held by Princeton University, which he used to document many details of this story. He places in context the "Velikovsky affair," which dealt with the opposition to his 1950 book *Worlds in Collision*. One of many controversies he illuminates is the question whether Velikovsky's book was reviewed (or refereed) before publication. The fact is that it was reviewed by several scientists who said, in effect, even though it was bunk as science, the book was still likely to be popular enough that its publication would be a sound business decision.

That is exactly what happened. Scientists excoriated the book for its obvious failings, but many non-scientist reviewers lavished praise upon it. This deep division between the "two cultures" of science and the humanities came as a shock to many scientists. Velikovsky, while of course pleased that his book rose to the top of the bestseller lists, was also stung by its unanimous condemnation by scientists. He never

understood their criticism of planets rapidly shifting orbits within historic time, and he sought their recognition as a *bona fide* scholar. He did not do this by publishing papers or making presentations at scientific conferences, but rather by courting individual scientists—especially his Princeton neighbor Albert Einstein. These efforts at personal diplomacy were not successful. Scientists immediately recognized that his planetary collisions, and his suggestion that electromagnetism rather than gravitation dominated planetary motions, were (in Einstein's terms) "crazy." Velikovsky was simply not speaking the same language as the scientific community.

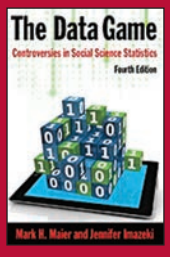
No advocate for an unorthodox perspective ever calls his or her work pseudoscience. This is a term of opprobrium, assigned by scientists who are defending the consensus.

But this is only half the story. It seemed likely that for all the immediate popularity of his book, he would quickly be forgotten. What makes this story so interesting, what elevates Velikovsky to the rank of true pseudoscientist, was the resurrection of interest in his work during the Vietnam War years, when he became a darling of the counterculture, gaining support among humanist scholars as well as rebellious students. He was invited to speak on campuses, conferences were held to discuss his ideas, and his books again ascended the best-seller charts. Precisely because of his rejection by the scientific community, he became the symbol of the lone scholar defying the conservative establishment.

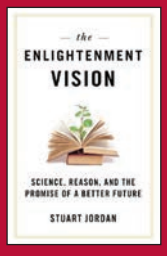
Gordin also explores the relationships between different pseudoscientists. Superficially, there were striking similarities

[NEW AND NOTABLE

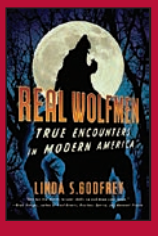
ALL WE HAVE TO FEAR: Psychiatry's Transformation of Natural Anxieties into Mental Disorders. Allan Horwitz and Jerome Wakefield. Two sociologists (and coauthors of *The Loss of Sadness*) discuss the ever-increasing professional diagnosis of anxiety disorders in America (up from 5 percent of the population in 1970 to 50 percent today) and suggest that the root cause is over-medicalization of normal and common anxiety. Oxford University Press, 2012, 320 pp., $29.95.



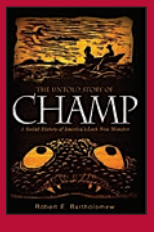
THE DATA GAME: Controversies in Social Science Statistics (Fourth Ed.). Mark H. Maier and Jennifer Imazeki. Intended as a supplement to college and university courses in statistics and social sciences, this readable book provides an interesting and well-referenced discussion of the uses (and abuses) of statistics in controversial social issues, including crime, education, economy, wealth, and public opinion polls. With an index, summaries, and case studies in each chapter, this book is a useful addition to popular statistics books by authors such as John Allen Paulos and Joel Best. M.E. Sharpe, Inc., 2012, 328 pp., $29.95.



THE ENLIGHTENMENT VISION: Science, Reason, and the Promise of a Better Future. Stuart Jordan. A retired NASA physicist and a CSI Fellow, Jordan argues that the historical Western Enlightenment remains the right vision for a higher civilization but that we have fallen short; and, more broadly, that sometime in the future, enlightenment values will expand and take hold in currently unpredictable ways. The book is dedicated to Paul Kurtz. Prometheus Books, 2013, 295 pp., $26.00.



REAL WOLFMEN: True Encounters in Modern America. Linda S. Godfrey. The author, who claims to be "America's foremost authority on modern-day werewolves," collects dozens of (presumably infallible) eyewitness reports to argue that werewolves may roam the country; though far too credulous, this skepticism-free book provides an interesting cryptozoological survey and discussion of modern werewolf reports. Tarcher/Penguin, 2012, 333 pp., $15.95.



THE UNTOLD STORY OF CHAMP: A Social History of America's Loch Ness Monster. Robert Bartholomew. New York-born historian Bartholomew tells the full story of the alleged Lake Champlain monster's rich, colorful history—separating fact, fiction, and speculation—and the equally colorful actions and personalities of modern-day monster hunters. State University of New York Press, 2012, 253 pp., $24.95.

—Benjamin Radford and Kendrick Frazier

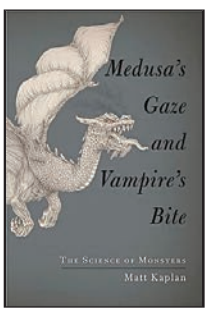
between Velikovsky and the creationist positions of Price in *The New Geology* (1923) and Whitcomb and Morris in *The Genesis Flood* (1961). All rejected the uniformitarian geology of their time. All sought to explain many geological features in terms of recent catastrophic events. And both sides sought evidence to support or verify events in the Old Testament, such as Noah's flood and the escape of the Israelites from Egypt. Velikovsky began correspondence with Price in 1951, and he sent the manuscript of his second book, *Earth in Upheaval*, to Price for his comments. Price replied that "While I have not always been able to agree with some of the details. I have admired the handsome way in which you have demolished Charles Lyell as well as [Charles Darwin]." Later in a review, Price described "*Earth in Upheaval* as one of the most thought-provoking books of modern times." However, Velikovsky and the creationists soon fell into dispute. Velikovsky sought naturalistic explanations for the Bible stories, while the creationists preferred direct attribution to acts of God. In the end, each side ostracized the other and went its own way, not acknowledging any commonality of ideas.

In his final chapter, Gordin turns to the new phase of pseudoscience, practiced by a few rogue scientists themselves. Climate change denialism is the prime example, where a handful of scientists, allied with an effective PR machine, are publicly challenging the scientific consensus that global warming is real and is due primarily to human consumption of fossil fuels. Scientists have watched in disbelief that as the evidence for global warming has become ever more solid, the deniers have been increasingly successful in the public and political arena. One has only to attend a meeting of atmospheric and climate scientists, such as the December 2012 American Geophysical Union, to appreciate the overwhelming support and increasing sophistication of our understating of human-caused global warming. At this gathering, thousands of scientists made hundreds of presentations of research results, ranging from the minutia of modeling the feedback of cloud formation on the greenhouse effect to documenting the incredible rate of loss of Arctic ice. Leaders of the scientific community made impassioned statements about the threat we face and the necessity for action. Yet outside the halls of science, polls show that half of Americans deny the reality of climate change, while Senator Jim Inhofe recently announced not only that human induced climate change is a hoax, but also boasted, "we have won" in the court of public opinion. Today pseudoscience is still with us, and is as dangerous a challenge to science as it ever was in the past. ■

David Morrison is a planetary scientist and director of the Carl Sagan Center for the Study of Life in the Universe at the SETI Institute. He is a Committee for Skeptical Inquiry Fellow and SKEPTICAL INQUIRER Contributing Editor and has received awards for science popular writing.

Flawed Look at Monsters

TERENCE HINES



Medusa's Gaze and Vampire's Bite: The Science of Monsters
By Matt Kaplan. Scribners, New York, 2012. ISBN 978-1-4516-6798-1. 244 pp. Hardcover, $26.00

The intent of *Medusa's Gaze and Vampire's Bite* is to provide scientific explanations for various monsters found in historical legend and literature up through the monsters of today as seen, mostly, in film. Had Kaplan succeeded in this task, he would have produced an exciting and interesting book. Instead, the book is filled with over-explanations, just-so stories, and college-level film criticism, all leavened by one howling error.

The topics covered are arranged in rough chronological order. Thus, the first half of the book deals with monsters from ancient myths and legends such as the Nemean lion, chimeras, the Minotaur, Medusa, Charybdis, and the like. But modern monsters are tossed in too—King Kong and the giant squid (the latter doesn't really belong since it does exist).

The explanations for ancient beasts are often fairly reasonable. For example, monsters that are giant versions of already scary animals are scary because, well, a giant version of something already scary (e.g., a lion) is even scarier. Snakelike monsters are scary because snakes are scary in the first place. Why do snakes, to this day, generate fear? Kaplan argues, convincingly, that the fear of snakes is part of human's evolutionary heritage. They posed real danger as proto-humans evolved. So there is an advantage to avoiding snakes even if one has not had a direct scary experience with them.

There is, however, a bit of a problem with this explanation of the commonality of snakes as ancient monsters. Spiders, like snakes, continue to generate fear. Spiders, like snakes, posed a hazard to humans while we were evolving. However, spiders, unlike snakes, did not serve as the basis for legends of any ancient monsters, as far as I know.

Kaplan does occasionally go overboard by trying to come up with a specific explanation for every little variation in a myth. For example, on pages 54 and 55 there is a discussion of the possible factual basis of the "cruel bellowing" of the Minotaur. There is much discussion of caves and other geologic phenomena. But isn't it just simpler to explain the details of this, and other, myths as devices to make them scarier? Or, as Amazon reviewer sonabeta pointed out in a November 20, 2012, review, "People sometimes just make things up."

Similarly, on page 102 the discussion turns to dragons. The question is why dragon myths are not consistent across time and place—some with wings and some without, some breathing fire and some not. Well, dragons aren't real so why should all stories about them be consistent? Still, Kaplan's explanation for the fire-breathing part is plausible and I won't spoil it for the reader by giving it away here.

Chapter 6 on "Hauntings—Demons, Ghosts, Spirits" is long on description of these phenomena and short on explanations. Hypnogogic and hypnopompic hallucinations go unmentioned, although there is a brief discussion of sleep atonia and sleep paralysis. But the full power of hypnogogia—with all of its attendant hallucinations—to convince people that ghosts are real is not made clear at all. This is a serious omission.

The book does contain one major and inexcusable howler in Chapter 7, a chapter dealing with vampires, zombies, and werewolves. Kaplan swallows hook, line, and sinker the long-refuted claim of Wade Davis that zombies are real and that they can be created by witch doctors using the poison tetrodotoxin (TTX), found, among other places, in the skin and internal organs of puffer fish native to Haiti. In accepting Davis's claims Kaplan ignores the overwhelming scientific literature that shows that 1) the "zombie powder" that Davis claims had TTX in it didn't and 2) even if it did, TTX in any quantity cannot produce zombies. TTX is a nerve poison that does not get into the brain. In terms of motor control, it affects only the skeletal musculature. Its specific effect is to render victims paralyzed, but it is not the stiff (rigid) paralysis of zombie legend but a flaccid paralysis where muscles lose their tone. In addition, in nonlethal doses TTX causes nausea and vomiting. The idea that just the right dose of TTX could transform a person into a zombie and keep them that way while they were walking around being productive slaves is absurd. And its absurdity has been known since the late 1980s. Sadly, Kaplan obviously didn't get the memo. For a more detailed discussion with appropriate references, see my article "Zombies and Tetrodotoxin" in the May/June 2008 Skeptical Inquirer (vol. 32, no. 3, pp. 60–62).

Kaplan swallows hook, line, and sinker the long-refuted claim of Wade Davis that zombies are real and that they can be created by witch doctors.

The last few chapters change focus from creatures of ancient myth and legend to more recent creations, especially alien abductions and movie monsters. The discussions here are quite poor, almost sophomoric, especially where movie monsters are concerned. The first topic in Chapter 8, "The Created," is the golem. Here either through bad writing or ignorance (or maybe both) Kaplan seems to state that there was only one golem, in Prague, and the whole golem legend dates only from 1909. In fact, there is ample evidence that the golem legend is much, much older. The *New Standard Jewish Encyclopedia* (Facts on File, 1992) notes that the legend dates from at least the fifteenth century. The *Jewish Encyclopedia*, vol. 6 (Ktav Publishing, 1964, reprint of the 1901–1906 edition) states that "In the Middle Ages arose the belief in the possibility of infusing life into a clay or wooden figure of a human being, which figure was termed a 'golem' by writers of the eighteenth century" (p. 37). Sadly, missing from this chapter is any discussion of that most modern of mythical creatures, the chupacabra. The creation of the myth of this creature was ably told by Ben Radford in his 2011 book *Tracking the Chupacabra*.

Chapter 9 is devoted to "Terror Resurrected—Dinosaurs." Here Kaplan discusses the recreation of our old thunder lizard friends in the movies and the possibility for real recreation through use of dinosaur DNA, which, of course, is the theme of the movie *Jurassic Park*. The discussions of both the film and dinosaur DNA leave much to be desired. Kaplan's critique of the problems with using DNA to recreate a dinosaur does not come close to that of Desalle and Lindley in their 1997 book *Science of Jurassic Park*. Kaplan does nicely discuss the problems of recreating a species that would find itself without its natural ecosystem to live in and would thus be confined to some sort of enclosures. However, even here he stumbles by an embarrassing acceptance of the characterization of chaos theory taken directly from the movie—a characterization that is typical Hollywood fantasy. In the film the character Dr. Ian Malcolm (played by Jeff Goldblum) says that chaos theory means that "biological systems are uncontrollable by [their] nature and therefore inherently threatening" (p. 187). Thus, no matter what protective measures are taken, any recreated dinosaurs will break free and terrorize the world. Or at least the local natives. This is Hollywood nonsense. It bears about as much relationship to actual chaos theory as the view of quantum mechanics espoused by New Age proponents does to actual quantum mechanics. In fact, chaos theory deals with systems in which tiny changes

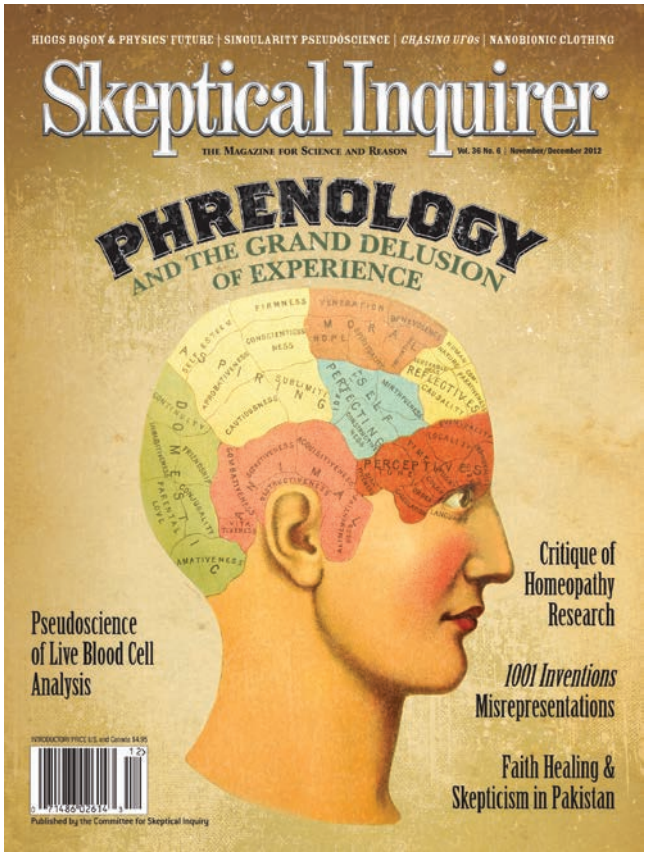
in initial conditions can have very large effects on the state of these systems at later times. The theory does not allow the impossible to happen or even predict that the very unlikely will.

The final chapter, "Extraterrestrial Threat—Aliens," suffers from much the same problem as the section on ghosts: long on description but short on explanation. The chapter starts with a description of the Betty and Barney Hill abduction case. It then states that: "Countless tales of abductions and bizarre sightings followed" (p. 198). Kaplan then asks why aliens are visiting Earth but not being detected by "all the space scanning technology that has been developed during the past decades" (p. 199). His answer? "It is an enigma." No, it's not, as even a slight familiarity with the skeptical literature on UFOs and alien abduction would have made clear. The rest of the chapter wanders in sort of a haze through various alien-themed science-fiction movies, including an interesting digression on parasites and how they can change animal behavior. And then it stops. It doesn't *end*. It just stops.

Perhaps this review should just stop as well. In summary, the book does contain a few interesting insights into the factual backgrounds of several legendary creatures. But in general it is poorly researched and written. Is it good enough for me to recommend that my university library purchase a copy? No. I make the same recommendation for the readers of this review.

Terence Hines is professor of psychology at Pace University and author of ***Pseudoscience and the Paranormal***. He is a Committee for Skeptical Inquiry Fellow.

[INBOX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Phrenology and Polygraph Tests

Geoffrey Dean's article on phrenology (SI, November/December 2012) is an excellent cautionary tale about pseudoscience that is based on experience, not controlled scientific studies. As I read this article, I realized that phrenology has been replaced with its modern-day version, the use of the polygraph as a "lie-detecting" machine. The parallels are overwhelming. Both are based on experience, not science. Both usually work to verify the practitioners' preconceptions. Both are used to determine criminality. Both have been required for employment. Both give results that are irreproducible and subject to interpretation. Both have been shown by controlled studies to be unreliable. And both are fashionable and satisfying in their own time period.

I was first alerted to the fraud of the "lie-detector" by two cases: A county assistant treasurer who was falsely accused of embezzlement, and a distraught widower who was falsely accused of murdering his wife. Both of these accused "failed" a polygraph exam (whatever that means) and were immediately convicted in the newspapers, with their reputations destroyed. They were both subsequently exonerated. The polygraph measures indicators of stress, and honest people who are falsely accused of heinous crimes are likely to "fail" the exam. On the other hand, hardened criminals show little stress when they are asked about their crimes.

Unlike phrenology, polygraph tests are still used and accepted by law-enforcement and government, and they are absolutely required for a range of government jobs (FBI, CIA, and police agencies). What should you do when you are asked to take a "polygraph exam" for a job or to prove your innocence of a crime? If you agree to take one, you are placing your reputation in the hands of a charlatan who can proclaim you to be guilty or innocent. If you refuse, you are assumed to be guilty. I would like to see the CSI do a careful study and expose of the use of polygraphs as "lie-detectors." The government should be pressured to abandon this modern-day form of phrenology and use more reliable methods to evaluate the honesty of suspects and job applicants.

L.G. Wade Jr., PhD
Walla Walla, Washington

Regarding Dr. Wade's suggestion to CSI, see the feature article "Exploring Controversies in the Art and Science of Polygraph Testing" by John Ruscio in our January/February 2005 issue, plus our News & Comment article "NAS Report Says Polygraph Testing Too Flawed for Security Screening" (SI, January/February 2003) and the Commentary "Polygraphs and the National Labs: Dangerous Ruse Undermines National Security" by Alan P. Zelicoff, SI, July/August 2001. Several of these, plus others, are available on our website (www.csicop.org/si). — Editor

Herbert Spencer did take phrenology seriously for some time, but he was not an "American psychologist." He was a British philosopher, a dabbler in biology, psychology, and sociology, the man who coined the phrase "survival of the fittest" and is widely regarded as the last serious

philosopher who tried to organize all of philosophy around a single concept—his being Darwinian evolution. As an early "social Darwinist," he is more an object of scorn than of serious study today, which is perhaps a pity.

Arthur M. Shapiro
Dept. of Evolution and Ecology
University of California
Davis, California

Home-Grown Homeopathy

Edzard Ernst's "Homeopathy: A Critique of Current Clinical Research" (SI, November/December 2012) is an excellent review of the poor quality of research on homeopathic treatment outcomes. However, I don't envy him the task he had of wading through the quagmire of this European research to warn its readers of being sucked in by it.

Closer to home, there is a new homeopathic remedy being touted on TV and even in pop-up adds on the *New York Times* website. It is Tag Away ($19.95 plus S&H), which claims to remove skin tags. Plenty of testimonials can be found with a web search, but I have yet to find a legitimate medical evaluation of this product. My family physician tells me, "It doesn't work. Only surgery removes skin tags."

Tag Away's active ingredient is reported to be "thuja occidentalis" (Eastern white cedar), which Wikipedia says was used medicinally by American Indians and used in the nineteenth century to treat warts, ringworm, and thrush. Since homeopathic medicines are produced by multiple dilutions of the active ingredient, I asked the Tag Away website for information on the homeopathic dilution of its ingredients, but the reply only repeated the list of ingredients without further information.

If Tag Away is truly "homeopathic," its active ingredient has been diluted to a point that it can have no possible effect. If the active ingredient is in a concentration strong enough to have some effect, Tag Away is being falsely advertised as "homeopathic." In either case, I expect we will be seeing more Tag Away ads and need to be wary.

David W. Briggs, PhD
Marion, Massachusetts

Medieval Islamic Maps

The article on an Islamic "golden era" of science ("A Golden Age of Harmony? Misrepresenting Science …," SI, November/December 2012) includes a photograph of a map produced during that era. The article said nothing about the map. As shown, the map made no sense to me, but turned 180 degrees to the orientation we are familiar with, with North as up, it makes perfect sense.

I can clearly make out the Persian Gulf, the Red Sea, the Arabian Peninsula and the Nile, and moving north, the Mediterranean, Crete, the Bosporus, the Black Sea, and the Caspian Sea. Moving westward across the Mediterranean the features are less familiar, but you can make out Sicily, Italy, Sardinia, and the Gates of Hercules.

It seems a fairly remarkable placement of the border between land and sea for a time when distances, sizes, and directions were known only approximately.

Lance Benson
Milton, Nova Scotia

Taner Edis responds:

Most medieval Arab maps have south at the top. For that matter, a lot of medieval Christian maps have east at the top.

Singularity: Pseudoscience . . . or Not?

It's gratifying to see Massimo Pigliucci (SI, November/December 2012) taking on Ray Kurzweil's singularity theory. The idea depends on the computational theory of mind, with its mistaken assumption that human intelligence is nothing other than computation. Computational ability is certainly a necessary, but not a sufficient, condition for intelligence. It is especially gratifying to see Pigliucci point to the inherent dualism in this theory (with Descartes's mind/body replaced by software/hardware). He goes on to say, "There is no reason to believe that that's the way consciousness arises, and there are good reasons to think that it is instead a biological process, tightly linked to other biological processes and substrates typical of the kind of animal we are." Aristotle could hardly have said it better. He argued that psychology, the study of what makes us human, is a part of biology. And what makes us human is our soul (psyche), which is not something immaterial (like mind for Descartes), but is rather the sum of capacities of the body: it is our ability to grow and take in nutrients (like plants), move and perceive (like animals) and understand and reason (as only we can). The realization that living bodies have capacities beyond the mere extension of matter gives this biological account of human intelligence a decided advantage over any kind of dualist account. Pigliucci has shown once more that Aristotle still lives.

George Englebretsen
Professor of Philosophy
Bishop's University
Sherbrooke, Quebec

Massimo Pigliucci's "Singularity As Pseudoscience" is marred by inaccuracies and pseudoskeptical rhetorical devices. He resorts to ad hominem attacks, ridicule, and ideological posturing to sidestep some important questions. So what if Pigliucci finds it "obscene" for "rich white men" to "salivate after their own mortality." That's like arguing that global warming is a fraud because Al Gore flies around in private jets and makes millions of dollars from green energy companies. In both cases, the validity of the ideas is independent of the motivations of the advocates. Many things that critics have called obscene have come to pass, for better or for worse.

It doesn't happen to be true that singulatarians as a group are rich white men. Many are impecunious students and struggling third-world programmers. Some of the women whose well-known work I find intriguing are Lisa Rein, Natasha Vita-More, Anna Salamon, and Heather Knight. Seminars led by Getnet Aseffa, a singulatarian of color, in Addis Ababa, Ethiopia, have attracted as many as 700 participants with scarcely a white face in the room. But why should that matter? White men from Silicon Valley have contributed a great deal to many fields and the benefits have spread to the rest of the world.

Why should we care if Ray Kurzweil takes 150 vitamin tablets a day? This is just a personal eccentricity not shared by other singularity researchers, and it is irrelevant to the scientific issues. And why does the fact that human intelligence is a biological process mean that computers can't achieve intelligence? Birds' and insects' wings are biological structures, tightly linked to other biological processes in their bodies, but that doesn't mean that airplanes need biological wings. And what's wrong with scientists trying to build something that has been anticipated in science fiction? Many important inventions were anticipated in fiction before they became reality.

If Pigliucci wants to argue that superhuman computer intelligence is a bad thing and we shouldn't build it, fair enough. Many singularitarians share his concern about the risks. Hugo de Garis has written a book about what he fears will be a war of artificial intelligences. But it is doubtful that there is any authority in the world that could effectively stifle scientific progress in this area. The same issue was raised about the atomic bomb, but that doesn't mean the science behind it was wrong.

If Pigliucci believes that human intelligence is a universal ultimate that can never be surpassed, that is more like a religious or metaphysical conviction than a scientific conclusion. Do

skeptics really want to use metaphysical assumptions such as Descartes's distinction between *rex extensa* and *rex cogitans* to resolve scientific questions? Very few singulatarians anticipate a purely symbolic mind anyway, many speculate about making the human body immortal, adding implants, or uploading the brain to robots.

Future study is a risky business, not amenable to the rigors of laboratory science. There is the temptation to ridicule and reject scenarios we don't like, while giving the benefit of the doubt to those that appeal to us. True skepticism needs to take a more objective stance. Trend extrapolation is an important tool for futurist analysis, and Ray Kurzweil has collected the best evidence he could find on many important time series and published it in detail for others to criticize. He has pointed out the exponential nature of many of the trends and made some thoughtful projections. They have been extensively criticized by a great many serious thinkers. If Gordon Moore has some disagreements with Kurzweil about the application of "Moore's Law," they deserve serious consideration. But Pigliucci doesn't tell us what the differences are, let alone why we should accept one view over the other. He just argues from authority. That shouldn't be good enough for the SKEPTICAL INQUIRER.

Readers looking for a serious examination of the questions Pigliucci has raised might be interested in these articles: 1) D. Chalmers, "The Singularity: A Philosophical Analysis," *Journal of Consciousness Studies* 17:7–65, 2010 and 2) S. Baum, B. Goertzel, and T. Goertzel, "How Long Until Human-Level AI? Results from an Expert Assessment," *Technological Forecasting and Social Change*, Vol 78, No 1, January 2011, pages 185–195.

Ted Goertzel
tedgoertzel@gmail.com
(Ted Goertzel recently retired as a sociology professor at Rutgers University.)

Massimo Pigliucci's article about the Singularity seemed more like the author's personal beliefs rather than an in depth study of the alleged future event. Whereas I agree that there are people out there who go off the deep end, the likelihood of nonhuman intelligence surpassing ours isn't that far fetched.

Pigliucci and I differ regarding the limits of technology. I have been designing integrated circuits for over thirty years and have seen Moore's law in action. While this can't continue endlessly, we still have a way to go before we hit fundamental limits. Meanwhile, smart phones and other devices get "smarter" every year and, I would argue, their users get dumber.

Historically, computers have been pursuing two main goals: more processing power and more memory. Nothing here suggests intelligence. When I was a teenager (in the 1950s), it was believed that a computer would be as intelligent as a human if it could beat a human at chess. That is now history. Of course the "intelligence bar" was then raised to favor humans. Cognitive science, combined with semiconductor technology, may yet give us super-human intelligence.

Those who say that "artificial" intelligence is impossible could argue the same for biological intelligence: we evolved from one-celled animals that couldn't think or reason. By logical extrapolation, neither can we. (Probably true!)

Gregory L. Schaffer
Senior IC Design Engineer
Cupertino, California

Massimo Pigliucci objects to many of Ray Kurzweil's projections related to the Singularity. Pigliucci objects to the idea of human immortality, not because of some logical or scientific reasons (many of which have been given by others), but because it violates the plot of a particular science *fiction* series! That's just *silly*, if not completely absurd! Do you really think science fiction is a completely accurate predictor of the future? You must be aware that there is a lot of science fiction where the robots do not try to take over the world and are helpers of humanity. Remember Data from *Star Trek*? In one of the Trek movies, Data had the opportunity to become a Borg, but he declined. There are even a number of movies where robots want to become human!

Pigliucci also objects to uploading one's mind or consciousness into another body. Again, this has happened in many science fiction stories, so, it must be possible, right? Did you see *Avatar*? His particular objection, ". . . they would likely find themselves in a self-made hell. Human psychology evolved alongside a body capable of sensations, emotions and so on—not just pure thought." This makes me wonder if Pigliucci even read Kurzweil's books! Kurzweil spends much time discussing the parts and functions of a human body we would likely want to keep as well as those we would be willing to discard. Emotions and sensations are definitely among those he thinks we will want to keep.

Not to say that Mr. Kurzweil's predictions are necessarily better than any particular science fiction story, they're just not necessarily any less.

Richard "Gilligan" Uschold
Port Orange, Florida

Massimo Pigliucci responds:

Predictably, my column on Ray Kurzweil and the (not likely to come) Singularity has generated a number of passionate responses. It seems to me, however, that several of these are off the mark. For instance, I did not argue on the basis of a sci-fi television series, I used said series to make fun of certain Singularitarian views. And speaking of making fun, clearly some readers of SI could use a bit more of a light-hearted spirit, since they obviously missed the difference between arguments against the idea of a Singularity (several of which are briefly sketched in the column) and ridicule directed to Kurzweil qua guru of what I regard as a pseudoscientific movement. The same readers very likely would not object to such ridicule were it directed to a purveyor of pseudoscience, which is what I regard Kurzweil to be, in this respect. Also, to ask for an in-depth analysis in a single column seems to me to be raising the bar ridiculously high, directing criticism to a straw man (a logical fallacy, as you know).

I never said that Singularitarianism is only the toy of rich white guys; I was referring in particular to the Singularity Institute gatherings in Silicon Valley, which are the nerve center of the movement. And yes, skeptics should be interested also in the social aspects of the movements they criticize, just like—for instance—it helps realizing the connection between climate change denial and libertarian political positions, without which one would be puzzled by why so many smart and scientifically literate people (including a good number of SI readers!) reject a notion backed by plenty of empirical evidence and accepted by the overwhelming majority of the relevant scientific community.

Finally, I never said that AI is impossible, only that it needs to take seriously the organic nature of the only type of intelligence we know of, our own. It is fine to gesture toward embodying intelligence in a robot, but talk of "uploading" one's own mind inside said robot is still fundamentally dualistic, and as far as I can tell is based on a seriously misguided concept of what intelligence is. Computers have gotten much faster and their memory has increased dramatically, but there is not a shred of evidence that they have gotten anywhere near human intelligence because the latter isn't (simply) a function of speed of calculation and storage capacity. Skeptics should pay attention to evidence, and Singularitarians—so far—have only wishful thinking and (some) science fiction on their side of the argument.

Curse That Painting!

I believe Polidoro is incorrect in his explanation of the smiling portrait of Teresa Rovere ("Curse That Painting!" SI, November/December 2012). Almost all of us look through camera viewfinders and we know from experience that they do not distort the image significantly. The true explanation is related to the level of detail or frequency of changes in detail, primarily luminance, we have available. When looking at the picture of the image we have a lot of detail and can see the shape of the mouth. However, when looking at the image seen through the viewfinder, the detail is lost and the coarse shading is perceived differently. You can get the same effect by simply backing away from the picture: as the detail disappears the smile appears. You can find examples on the Internet and my favorite is of a picture that changes from Einstein to Marilyn Monroe as you move away; search the web for "Albert Einstein Marilyn Monroe" and you'll soon find it.

You can confirm that the viewfinder is not distorting the image by pointing it at graph paper; it will not be significantly distorted.

Richard Turnock
Toronto, Ontario, Canada

I was living in South Yorkshire when the Curse of the Crying Boy story blew up in 1985, and I remember stories that copies of the painting had defied attempts to burn them. I came home one day and found my mother had been given a painting by a neighbor—yes, it was the Crying Boy! I soon had it on a backyard bonfire—because I thought it was ghastly kitsch, not because I believe in curses—and had no trouble at all in burning it!

Ray Ward
London, U.K.

Poll Data Alarming

Kendrick Frazier's assessment of the Gallup Poll's survey about U.S. beliefs on evolution (News and Comment, SI, September /October 2012) is a good example of the old saw "there are lies, damnable lies, and statistics." While it is true that the survey indicated little change in the percentage of Americans who reject evolution, bad as that is, over a period of thirty years, it also reflected an alarming development between 2011 and 2012, with the percentage of creationists jumping from 40 percent to 46 percent, while the believers in theistic evolution fell from 38 percent to 32 percent and the advocates of evolution without God dropped from 16 percent to 15 percent, reversing a rising trend going back eleven years. Given the increased importance of scientific literacy in a world confronted by a myriad of complex problems ranging from global warming to overpopulation, the fact that after the improvements seen in 2011 we are back to the dismal levels of thirty years ago is hardly grounds for celebration.

Dennis Middlebrooks
Brooklyn, New York

Race Real

I was dismayed at Kenneth Krause's dogmatic statements about race (SI, July/August 2012), which I find not typical of the otherwise excellent articles in your fine magazine. He says, in essence, that one cannot distinguish a black African from a blond Swede because intermarriage can create intermediate points. Because one cannot find any particular point of demarcation, the end points are identical. This is absurd.

Mr. Krause, do you like fried chicken? (Probably yes.) Do you like to eat raw chicken? (Probably no.) Can you point to the precise instant when a raw chicken becomes a fried chicken? (Not likely.) Therefore, according to Mr. Krause, the end points are identical because you cannot draw a line anywhere. If you really believe that, Mr. Krause, I want to see you eat a raw chicken on camera.

Don Dilworth
dondilworth@myfairpoint.net

The Shroud of Turin: An Artist's Perspective

I am a professional artist who has studied human anatomy and painted several portraits. I do not believe that the face of Jesus on the Shroud of Turin is an anatomically accurate depiction of a real person. Several years ago, I met and spoke with Joe Nickell. Joe is an artist and skeptical investigator who has studied the Shroud of Turin extensively, wrote a book on the subject [*which used anatomical, iconographic, and historical evidence to conclude that the elongated figure on the shroud was a work of French gothic art—supported by a fourteenth-century bishop's report that such an artist confessed—Editors*], and appeared on numerous television programs.

I told Joe that to me the image of Jesus's *head* on the cloth resembles a common medieval to early Renaissance stylized depiction of a person. Jesus's face appears too large for the surrounding size of the head, and his eyes are located too high. In addition to making faces too large, amateur artists tend to place the eyes about 2/3 to 3/4 up from the base of the chin to the top of the head. Human eyes are actually located close to the middle of the head. Check this out for yourself next time you look in a mirror! These common amateur and medieval artists' characterizations are based upon idealistic perceptions, not upon an attempt toward anatomical accuracy or realism.

Also, a popular artistic stylization in the Middle Ages to early Renaissance was the exaggeration of long, thin, European noses. Observe the similarity of medieval paintings to that of the face on the shroud: long thin noses, disproportionately large faces compared to head size, and eyes placed high on the heads. These similarities clearly show that the face of Jesus on the shroud more closely resembles the stylized and anatomically inaccurate faces of medieval paintings than that of a real person.

My observations are consistent with the hypothesis that the Shroud of Turin is the work of a medieval artist.

Robert A. Richert
RichertArt.com

Ouch! That Stings

As many readers noticed, the uncaptioned illustration with the "Skeptical Inquiree" column "The Mysterious Bee Deaths" in our January/February 2013 issue was not of a bee but of a wasp. — EDITOR

[FEEDBACK

The letters column is a forum on matters raised in previous issues. **Letters should be no longer than 225 words**. Due to the volume of letters we receive, not all can be published. Send letters as email text (not attachments) to letters@csicop.org. In the subject line, provide your surname and informative identification, e.g.: "Smith Letter on Jones evolution article." Include your name and address at the end of the letter. You may also mail your letter to the editor to 944 Deer Dr. NE, Albuquerque, NM 87122.

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SKEPTICAL ANNIVERSARIES

by Tim Farley

March 3, 1978: David Rorvik claims to have been involved in the first human cloning. A court later rules the story a hoax.

March 12, 1973: *Time* magazine first documents how Stanford Research Institute had researched Uri Geller's abilities, believing them to be paranormal.

March 18, 1913: Kansas becomes the first U.S. state to enact a law licensing chiropractors. The first license under this law was issued two years later.

March 21, 1988: CSICOP's delegation to China (to investigate belief in the paranormal in that country) began.

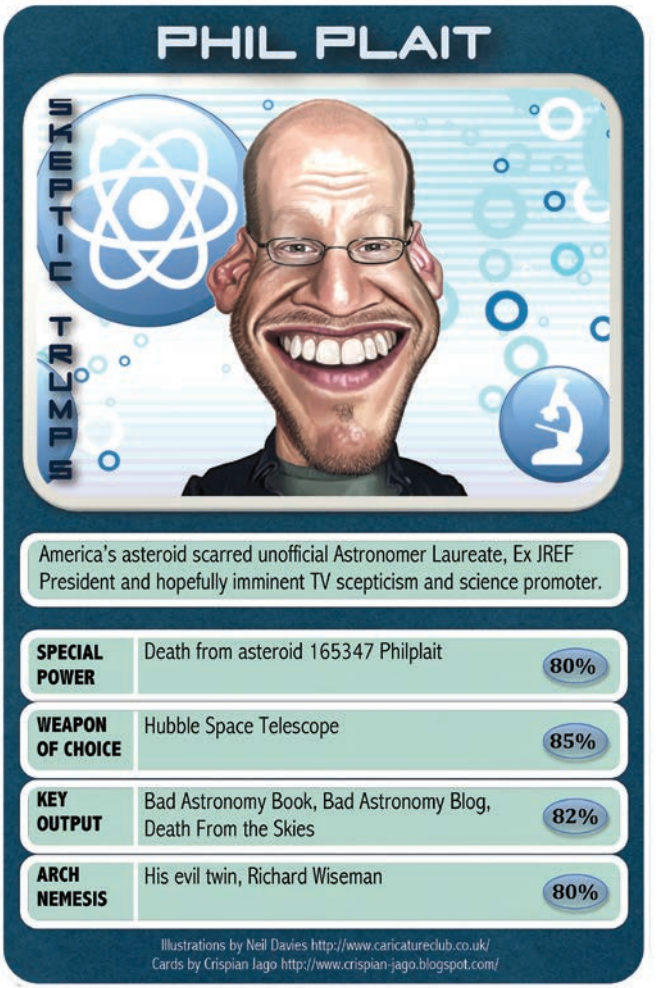
April 5, 1923: Lord Carnarvon's death in a Cairo hotel (a few months after the Tutankhamun excavation) gives rise to a belief in a "mummy's curse."

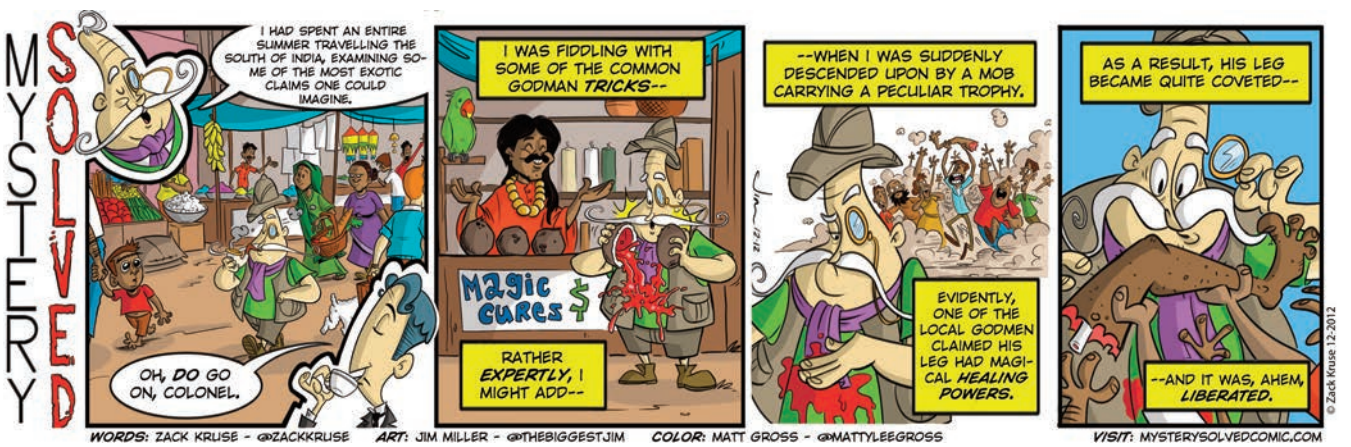
April 16, 1843: The hoaxed "Kinderhook plates," alleged to be Mormon artifacts, were discovered. They weren't fully disavowed by the church until 1981.

April 21, 1988: Samples were taken of the Shroud of Turin for carbon dating. The resulting paper concluded it dates from the medieval era.

Tim Farley is a research fellow with the James Randi Educational Foundation and created the website whatstheharm.net.

SKEPTIC TRUMP CARDS




MYSTERY SOLVED
I HAD SPENT AN ENTIRE SUMMER TRAVELLING THE SOUTH OF INDIA, EXAMINING SOME OF THE MOST EXOTIC CLAIMS ONE COULD IMAGINE.
OH, DO GO ON, COLONEL.
I WAS FIDDLING WITH SOME OF THE COMMON GODMAN TRICKS--
Magic cures $
RATHER EXPERTLY, I MIGHT ADD--
--WHEN I WAS SUDDENLY DESCENDED UPON BY A MOB CARRYING A PECULIAR TROPHY.
EVIDENTLY, ONE OF THE LOCAL GODMEN CLAIMED HIS LEG HAD MAGICAL HEALING POWERS.
AS A RESULT, HIS LEG BECAME QUITE COVETED--
--AND IT WAS, AHEM, LIBERATED.
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WORDS: ZACK KRUSE - @ZACKKRUSE ART: JIM MILLER - @THEBIGGESTJIM COLOR: MATT GROSS - @MATTYLEEGROSS VISIT: MYSTERYSOLVEDCOMIC.COM

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